



EMC[®] VSI for VMware vSphere Web Client

Version 6.1

Product Guide

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

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Note: This document was accurate at publication time. Go to [EMC Online Support](#) to ensure that you are using the latest version of this document.

Purpose

This document describes how to configure and use EMC Virtual Storage Integrator (VSI) for VMware vSphere Web Client 6.1.

Audience

This solution was designed for VMware administrators who manage shared NFS or VMFS storage through a web interface.

After the storage administrator has planned and implemented the storage environment, the VMware administrator sets up the VMware virtual environment and loads EMC VSI for VMware vSphere Web Client 6.1. This software allows VMware administrators to provision and manage datastores, virtual machines, and RDMs on the supported EMC storage systems without the direct involvement of the storage administrator.

Related documentation

The following documents contain additional information and are available on [EMC Online Support](#):

- *EMC VSI for VMware vSphere Web Client Release Notes*
- ViPR documentation
- SMI-S Provider Release Notes

Conventions used in this document

NOTICE

NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

Typographical conventions

EMC uses the following type style conventions in this document:

Bold	Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)
<i>Italic</i>	Use for full titles of publications referenced in text
Monospace	Use for: <ul style="list-style-type: none"> • System output, such as an error message or script • System code • Pathnames, filenames, prompts, and syntax • Commands and options
<i>Monospace italic</i>	Use for variables.
Monospace bold	Use for user input.
[]	Square brackets enclose optional values
	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

Where to get help

EMC support, product, and licensing information can be obtained as follows:

Product information — For documentation, release notes, software updates, or information about EMC products, go to [EMC Online Support](#).

Technical support — Go to EMC Online Support and click **Service Center**. You will see several options for contacting EMC Technical Support. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

`techpubcomments@emc.com`

CHAPTER 1

Introduction

This chapter includes the following topics:

◆ Overview.....	8
◆ Software prerequisites	9
◆ Key terms.....	10

Overview

The EMC® Virtual Storage Integrator (VSI) for VMware vSphere Web Client is a plug-in for VMware vCenter. It enables administrators to view, manage, and optimize storage for VMware ESX servers and hosts and then map that storage to the hosts.

VSI consists of a graphical user interface and the EMC Solutions Integration Service, which provides communication and access to the storage systems. Depending on the platform, tasks that you can perform with VSI include:

- ◆ Storage provisioning
- ◆ Cloning
- ◆ Block deduplication
- ◆ Compression
- ◆ Storage mapping
- ◆ Capacity monitoring

Using the Storage Access Control feature, a storage administrator can enable virtual machine administrators to perform management tasks on a set of storage pools. The current version of VSI supports the following EMC storage systems and features:

- ◆ EMC® ViPR™ software-defined storage
 - View properties of NFS and VMFS datastores and RDM volumes
 - Provision NFS and VMFS datastores and RDM volumes
- ◆ EMC VNX® series storage for ESX/ESXi hosts
 - View properties of NFS and VMFS datastores and RDM volumes
 - Provision NFS and VMFS datastores and RDM volumes
 - Compress and decompress storage system objects on NFS and VMFS datastores
 - Enable and disable block deduplication on VMFS datastores
 - Create fast clones and full clones of virtual machines on NFS datastores
- ◆ EMC Symmetrix® VMAX® storage systems
 - View properties of VMFS datastores and RDM volumes
 - Provision VMFS datastores and RDM volumes

Figure 1 depicts the architecture of a typical deployment of VSI for VMware vSphere Web Client.

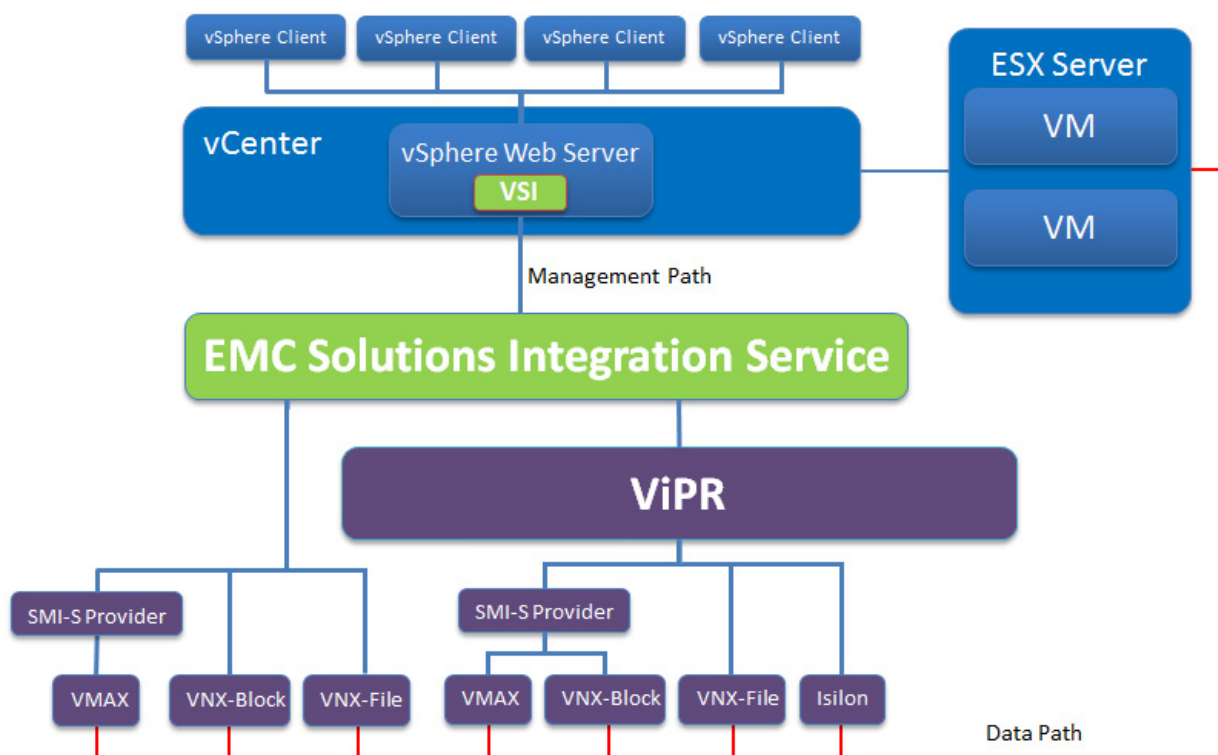


Figure 1 VSI configuration diagram

Software prerequisites

Table 1 lists the software requirements for the VSI for VMware vSphere Web Client.

Table 1 Software prerequisites

Software	Version
VMware vSphere	Version 5.1 or 5.5*
VMware vCenter	Version 5.1 or 5.5*
VMware vSphere Web Client	Version 5.1 or 5.5*
VMware ESX/ESXi host	Version 5.1 or 5.5*
EMC Solutions Integration Service	Version 2.0 or later
SMI-S Array Provider (VMAX only)	Version 4.6.0 or later
EMC ViPR (not required for VNX or VMAX)	Version 1.1
Web browser with JavaScript enabled	All browser versions that are compatible with the vCenter Web Client (for example: Mozilla Firefox, Microsoft Internet Explorer, or Google Chrome). The VMware website provides a list of compatible browser versions.
* Including patched versions	

Key terms

[Table 2](#) lists the terms used in this guide.

Table 2 Definition of terms

Term	Definition
Cascaded storage group	Provides the ability to nest multiple storage groups in a single masking view.
Cluster	A group of hosts that share resources and have a common management interface. Changes made at the cluster level impact all the hosts within the cluster.
Compress	A VSI function that enables an object to use less space on disk than it would normally occupy. The value of the Compressed field is either Yes or No , indicating whether compression has been applied.
Compute resource	A managed object that represents either a single host or a cluster of hosts available for backing up virtual machines.
Data Mover	A cabinet component in VNX Network Server that runs its own operating system to retrieve data from a storage device and make it available to a network client. A Data Mover is also referred to as a blade.
DHSM	Distributed hierarchical storage management.
ESX/ESXi	The VMware virtualization applications that abstract processor, memory, storage, and networking resources into multiple virtual machines running side-by-side on the same physical server.
Fast clone	A method of making a thin copy of a virtual machine using VNX NFS-based snapshots.
File system	The network file system (NFS). NFS is a network file system protocol that allows a user on a client computer to access files over a network as easily as if the network devices were attached to the client computer's local disks.
Full clone	A method of creating an independent copy of a virtual machine.
Initiator group	Specifies which hosts can access specified LUNs on the storage system.
LUN	Logical unit number. A SCSI identifier used by Fibre Channel and iSCSI to identify a disk, a subset of a disk, or an array of disks that is layered beneath a VMFS datastore or represented by an RDM (raw device mapping) volume.
Path	The NFS path to the virtual machine.
Port group	Aggregate multiple ports under a common configuration and provide a stable anchor point for virtual machines connecting to labeled networks
Provisioning	The process of creating a functioning virtual machine by assigning resources such as CPU, memory, and virtual hardware, and then deploying a system image.
Snap	A point-in-time image of a file system that does not mirror the data on the file system, thereby using less disk space than a standard backup. A snap is also known as a snapshot.

Table 2 Definition of terms

Term	Definition
Storage pool	An aggregation of disk storage from which you can provision datastores.
Storage processor (SP)	A cabinet component in an array that runs its own operating system and provides access to the data stored on the array. Each SP has its own IP address.
Thick provisioning lazy zeroed	A disk format that allocates all disk space but does not delete existing content when the disk is created.
Thick provisioning eager zeroed	A disk format that allocates all disk space and deletes any previous content when the disk is created; this option can take longer than the other two disk provisioning options.
Thin provision	A disk format that allocates only the disk space that is currently needed.
Thin pool	A collection of data devices that provide storage capacity for thin devices.
Tiering policy	The method that the array uses to balance cost and performance by moving data between different drive types within a storage pool. Tiering is not available for RAID group LUNs.
Virtual appliance (vApp)	A collection of preconfigured virtual machines that combine applications with the operating systems that they require.
Virtual machine	A software-based emulation of a computer that, like a physical computer, runs an operating system and applications. An operating system installed on a virtual machine is called a guest operating system.
VMAX meta device	A VMAX device that contains multiple thin devices and is presented to the host as a single device. A meta device can be concatenated or striped.
VMAX thin device	A host-accessible device that has no storage directly associated with it.

CHAPTER 2

Installing VSI and Setting Up the Environment

This chapter includes the following topics:

- ◆ Overview..... 14
- ◆ Installing or upgrading VSI 14
- ◆ Configuring the environment 14

Overview

This chapter provides instructions for installing the VSI plug-in, deploying the Solutions Integration Service, and using the Solutions Integration Service to register VSI and enable the VSI features. [Chapter 3](#) discusses additional functions of the Solutions Integration Service.

Installing or upgrading VSI

To install or upgrade VSI for VMware vSphere Web Client, complete the following steps:

1. Install the VMware vSphere Web Client using the VMware documentation at www.vmware.com.

“[Software prerequisites](#)” on [page 9](#) provides a list of required software and version numbers.

2. Download the Solutions Integration Service OVA file from [EMC Online Support](#).
File name:

`emc_solutions_integration_service_x86_64_OVF10.ova`

Note: The Solutions Integration Service OVA package contains the VSI plug-in. To upgrade to a newer version of the VSI plug-in, download the latest OVA package from [EMC Online Support](#), and then follow the instructions in this chapter to enable VSI.

Configuring the environment

Complete the steps in the following sections to deploy the Solutions Integration Service and enable the VSI plug-in.

Identifying parameter values

Gather and record the required parameter values described in [Table 3](#).

Table 3 Required parameter values

Item	Component	Description	Value	Notes
1	vSphere Web Client	URL/IP address and port number of the VMware vSphere Web Server (example: <code>https://192.168.0.1:9443</code>)		
		Login credentials (username and password)		Administrator privileges required
2	vCenter server where the OVF/OVA is to be deployed	vCenter server IP address (example: <code>192.168.0.2</code>)		
		vCenter login credentials (username and password)		
3	Solutions Integration Service OVA file location	URL or a folder location on your local drive (example: <code>Local disk (C:) > Users > <i>username</i> > Downloads</code>)		

Table 3 Required parameter values

Item	Component	Description	Value	Notes
4	Deployment destination for the Solutions Integration Service	Path and folder name on the VMware vCenter server where the service is to run		
5	Compute resource	A cluster, host, or resource pool		
6	Source network	The name and IP address format of the network where the service is to be deployed		
7	Custom properties/IP addresses	<ul style="list-style-type: none"> • Public network IP address • Default gateway • DNS servers (if needed) • Netmask IP address 		

Deploying the Solutions Integration Service

To deploy the EMC VSI Solutions Integration Service, use the values in [Table 3](#) to complete the following steps.

1. Log in to the vSphere Web Client (Item 1).
2. Select **vCenter > Inventory Trees > Hosts and Clusters**.
Optionally, expand the directory to select a specific folder or datastore.
3. Right-click the vCenter, cluster, or host storage device (Item 2) and select **Deploy OVF Template**.
The following message appears: This site is using the VMware Client integration Plug-In. Do you want to allow it to access your operating system?
4. Click **Allow**.
The Deploy OVF Template wizard appears.
5. In **Select source**, enter the location of the Solutions Integration Service OVA file (Item 3), and then click **Next**.
6. On the **Review details** screen, verify that the information is correct and click **Next**.
7. Accept the **End User License Agreement (EULA)** and click **Next**.
8. In **Select name and folder**, type a name for the destination folder or accept the default.
9. Select the folder or datacenter location (Item 4) where you want to save the Solutions Integration Service OVA file and click **Next**.
10. For **Select a resource**, select the compute resource (Item 5) and click **Next**.
11. For **Select storage**:
 - a. Select an appropriate disk format.
 - b. Select the datastore for the deployed OVF/OVA for the project.
 - c. Click **Next**.

12. For **Setup network**, use the values in Item 6 to:
 - a. Select a network.
 - b. Select the IP address format IPV4 for the Solutions Integration Service.
13. For the **Customize Template** properties, enter the following details (Item 7):
 - a. Public network IP address
 - b. Default Gateway
 - c. DNS Servers
 - d. Netmask IP address
14. Click **Next**.
15. In the **Ready to Complete** dialog box:
 - a. Verify the details.
 - b. If you want the Solutions Integration Service to power on immediately after the OVF/OVA deployment, select the check box in the **Ready to Complete** dialog box. Otherwise, you can power it on manually.
 - c. Click **Finish**.
16. Right-click the virtual machine with the newly deployed EMC Solutions Integration Service and select **Power On**.
17. Wait for the deployment to finish and for the Solutions Integration Service to be operational.
18. Verify the REST web service as follows:
 - a. Log in as follows:
`https://<Solutions_Integration_Service_IP_Address>:8443/vsi_usm/`
For example:
`https://192.168.0.3:8443/vsi_usm/`
 - b. Accept all certificates or add them to exceptions.The **Welcome to the EMC VSI Solutions Integration Service** screen appears and the EMC VSI Solutions Integration Service is ready for use.

Registering the VSI plug-in to download and enable the VSI plug-in extensions

1. Using a browser, go to the Solutions Integration Service Administrator web page. Log in with the Solutions Integration Service credentials as follows:
`https://<Solutions_Integration_Service_IP_Address>:8443/vsi_usm/admin`
For example:
`https://192.168.0.3:8443/vsi_usm/admin`

Note: If this is the first time that you are logging in, see [“Logging in to the Solutions Integration Service” on page 22](#).

The **Solutions Integration Service Administration** main window appears, as shown in [Figure 2](#).

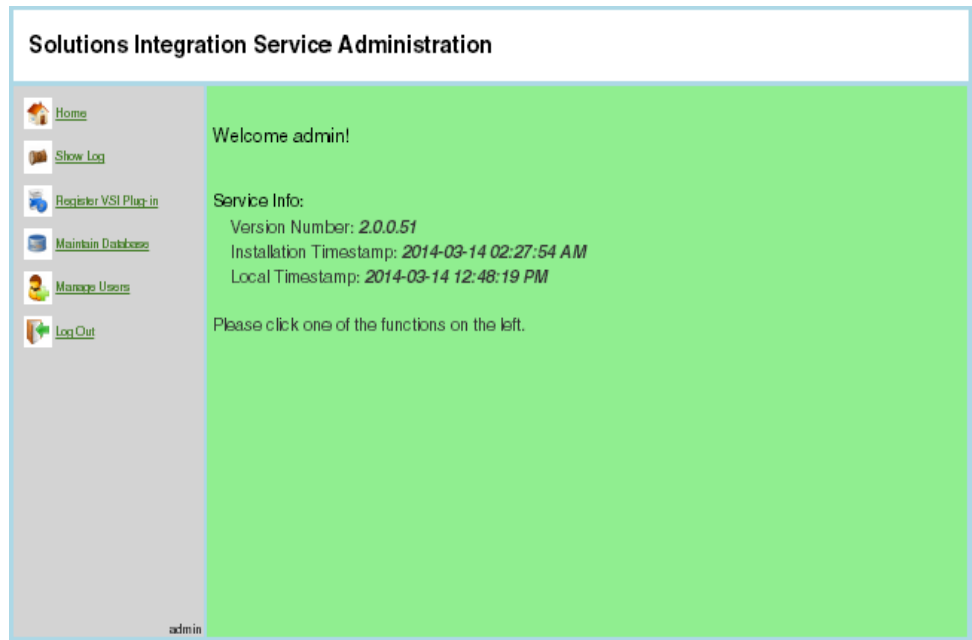


Figure 2 Solutions Integration Service Administration main window

2. Select **Register VSI Plug-in**.
3. Enter the values for the following parameters and click **Register**.
 - **vCenter IP/Hostname:** The IP address that contains the VSI plug-in package. This is the IP address of the vCenter to which you are registering the VSI plug-in. If you are using the vCenter hostname, ensure that DNS is configured.
 - **vCenter Username:** The username that has administrative privileges.
 - **vCenter Password:** The administrator's password.
 - **Admin Email (Optional):** The email address to which notifications should be sent.
4. Browse to the vSphere Web Client address using the information from [Table 3](#).
After you log in, the VSI plug-in is downloaded and deployed.

Note: The download takes several minutes.

5. In the **vSphere Web Client** window, select **vCenter** in the navigation pane to verify that **EMC VSI** is listed, as shown in [Figure 3](#).

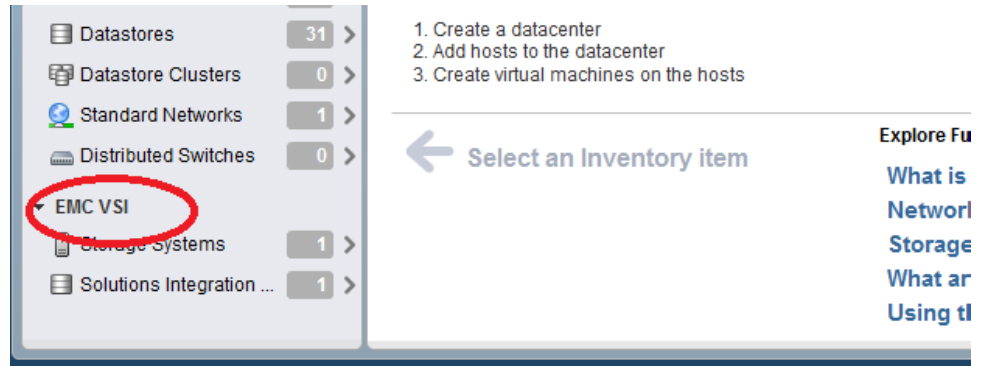


Figure 3 Verifying that EMC VSI is installed

CHAPTER 3

Configuring and using the EMC Solutions Integration Service

This chapter includes the following topics:

◆ About the EMC Solutions Integration Service.....	20
◆ Configuring the Solutions Integration Service	20
◆ Logging in to the Solutions Integration Service	22
◆ Using the Solutions Integration Service	23
◆ Controlling storage access.....	27

About the EMC Solutions Integration Service

The Solutions Integration Service enables administrators to view log files, register the VSI plug-in, provide access to storage administrators and users, and back up and restore configurations.

Configuring the Solutions Integration Service

The Solutions Integration Service provides the communication between the storage system and VMware vSphere, as shown in [Figure 1 on page 9](#). Before you can use VSI, you must configure access to the Solutions Integration Service by registering the service with the appropriate credentials.

Registering the Solutions Integration Service

Registering the Solutions Integration Service enables it to communicate with the vCenter.

Note: You can register only one Solutions Integration Service. For a VSI upgrade or to use a different server, you must first unregister the current service. [“Unregistering or refreshing the Solutions Integration Service” on page 22](#) provides more information.

1. Log in to the vSphere Web Client with the IP address and port number.
For example, `https://192.168.0.1:9443/vsphere-client`
2. Select **Home > vCenter > EMC VSI > Solutions Integration Service**.
3. Under **Actions** select **Register EMC Solutions Integration Service**, as shown in [Figure 4](#).

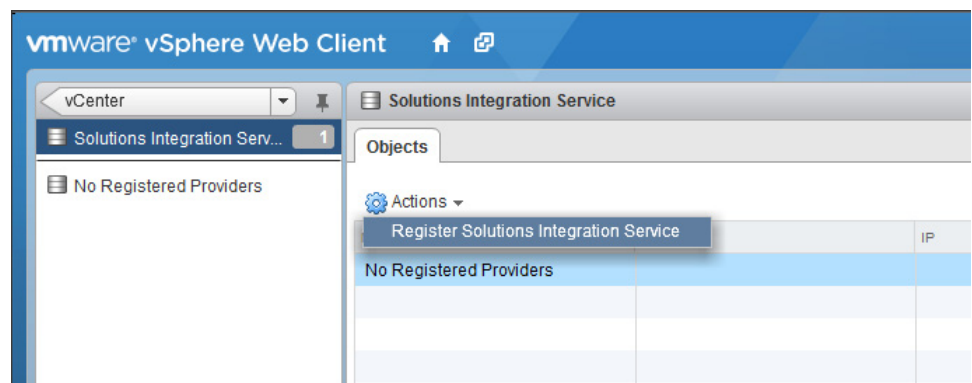


Figure 4 Registering the Solutions Integration Service

4. In the **Register EMC Solutions Integration Service** wizard, enter values for the following parameters:
 - **EMC Solutions Integration Service IP:** The IP address of the Solutions Integration Service virtual appliance (vApp).
 - **EMC Solutions Integration Service Password:** The Solutions Integration Service administrator password.

- **Confirm Solutions Integration Service Password:** Verification of the Solutions Integration Service password.
- **vCenter Password:** The password for the specified **vCenter User Name**.

Values for the following parameters are automatically provided and cannot be changed:

- **EMC Solutions Integration Service User Name:** Determined by the system.
- **vCenter IP:** The address for the web client.
- **vCenter User Name:** The username that you used to log in to the vCenter.

This can be different from your login username.

5. Click **OK**.

After you have registered the EMC Solutions Integration Service, you can register storage systems. See [“Registering storage systems” on page 34](#).

Viewing Solutions Integration Service details

1. Select **Home > vCenter > EMC VSI > Solutions Integration Service**.
2. Click **VSI Server** to view the name, status, version and IP address of the Solutions Integration Service, as shown in [Figure 5](#).

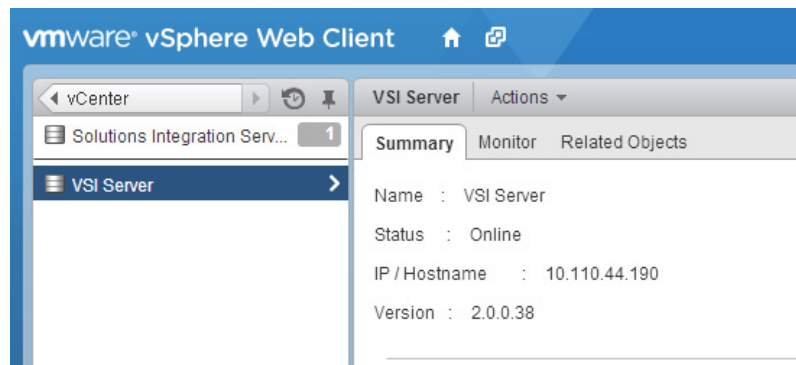


Figure 5 Viewing VSI server Summary information

Status definitions are:

- **Online:** The Solutions Integration Service is connected and functional.
- **Unreachable:** The Solutions Integration Service is unreachable or shut down.
- **Unable to Login:** The Solutions Integration Service is not connected. Do one of the following:
 - Unregister and then register the Solutions Integration Service.
 - Select **Rescan** under the **Actions** menu for the Solutions Integration Service to activate it.

Unregistering or refreshing the Solutions Integration Service

You can register only one Solutions Integration Service. To upgrade VSI or use a different server, you must unregister the current service. If the service is registered but the summary indicates **Unable to log in**, refresh the window to activate it.

1. Select **Home > vCenter > EMC VSI > Solutions Integration Service**.
2. Under **Actions** select **Unregister EMC Solutions Integration Service**, as shown in Figure 6.
 - Select **Unregister Solutions Integration Service** to disable communication with the Solutions Integration Service.
 - Select **Rescan Solutions Integration Service** to refresh the Solutions Integration Service window.

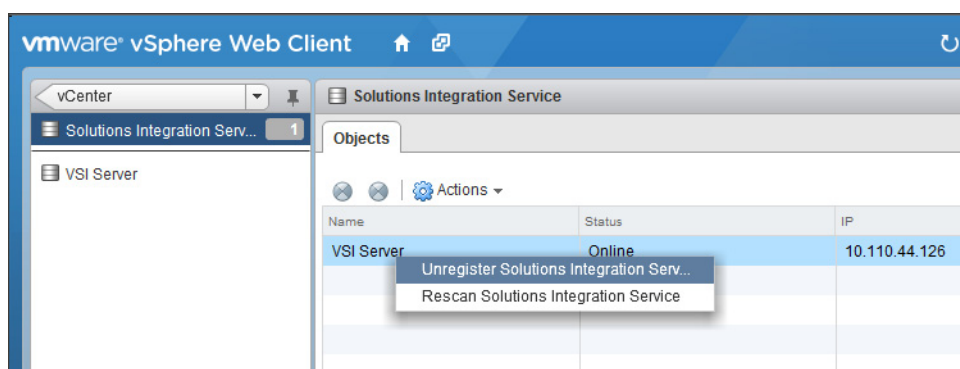


Figure 6 Unregistering or refreshing the Solutions Integration Service

Logging in to the Solutions Integration Service

The first time you log in to the Solutions Integration Service, you must change your password.

Note: After the Solutions Integration Service password is changed, it cannot be modified. If the password is lost, you must redeploy the Solutions Integration Service and use the default login ID and password to log in.

1. In your web browser, type the following IP address:
`https://<Solutions_Integration_Service_IP_Address>:8443/vsi_`
`usm.`
 For example: `https://10.110.44.126:8443/vsi_usm`
2. Click **Administration**.
3. Type the following login ID and password:
 - Login ID: **admin**
 - Password: **ChangeMe**
4. Type a new password, and then click **Change**.
 Ensure that you save your new password in a secure location.

The password change confirmation message appears with the following information:

- **Version Number:** The version of the Solutions Integration Service
- **Installation Timestamp:** The time at which the Solutions Integration Service was deployed
- **Local Timestamp:** The current time on the Solutions Integration Service

Using the Solutions Integration Service

Log in to the Solutions Integration Service with administrator credentials to access the features shown in [Figure 7](#).

To access the **Storage Access Control** features, you must log in with **storage administrator** credentials. “[Controlling storage access](#)” on [page 27](#) provides more information.

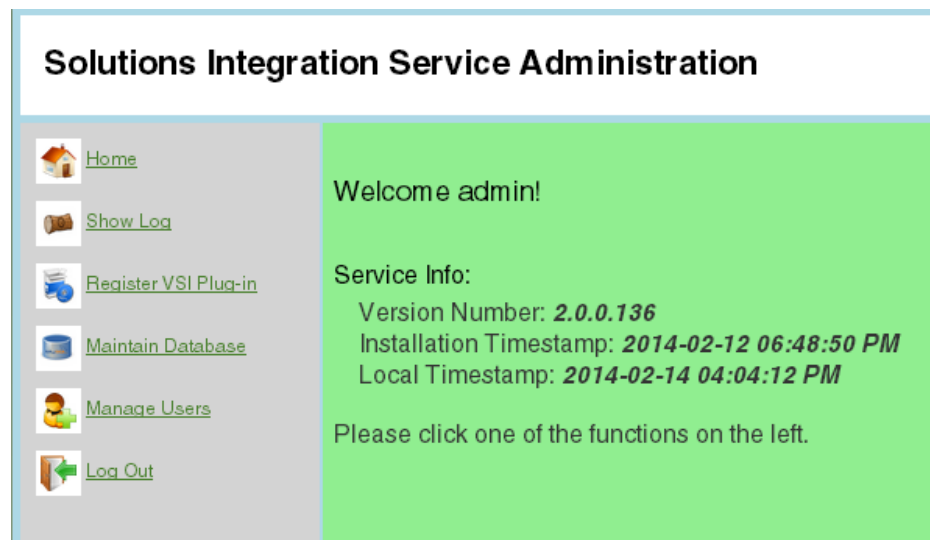


Figure 7 Solutions Integration Service Administration Home screen

[Table 4](#) describes the menu items in the **Solutions Integration Service Administration** window.

Table 4 Solutions Integration Service Administration menu items

Menu item	Function	Reference
Home	Displays version and timestamp information	
Show Log	Displays Solutions Integration Service log files	“Viewing log files” on page 24
Register the VSI Plug-in	Provides text boxes for entering the information needed to register the VSI Plug-in	“Registering the VSI plug-in to download and enable the VSI plug-in extensions” on page 16
Maintain Database	Provides the functionality to view, create, or restore a database backup	“Maintaining the Solutions Integration Service database” on page 26

Table 4 Solutions Integration Service Administration menu items

Menu item	Function	Reference
Manage Users	Allows you to add or delete storage administrators and users	“Managing users” on page 25
Log out	Logs you out of the Solutions Integration Service Administration window	
Storage Access Control	When logged in as a storage administrator, enables you to register block and file storage.	“Controlling storage access” on page 27

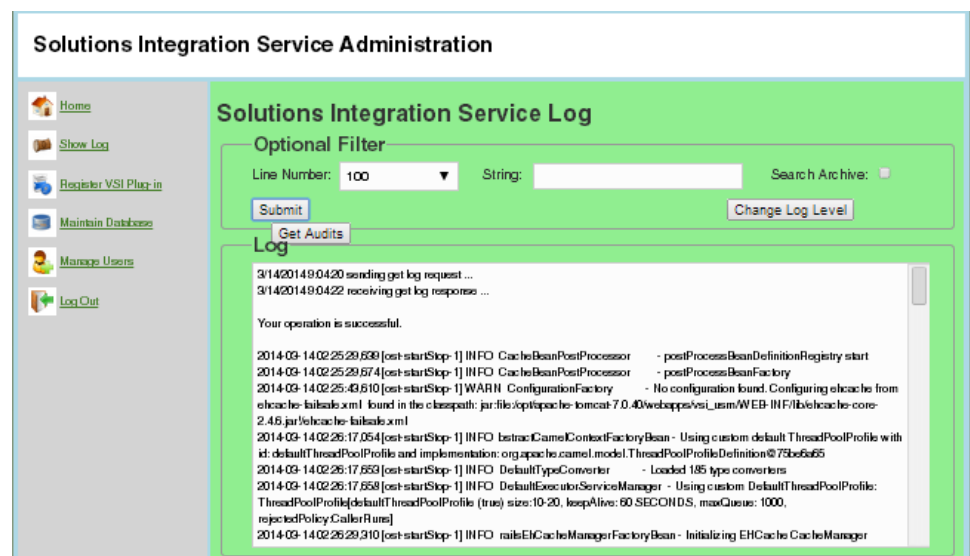
Viewing log files

The Solutions Integration Service log files provide activity and configuration information about the Solutions Integration Service database that can help troubleshoot or restore settings after a failure event.

To view the log files:

1. From the **Solutions Integration Service Administration** window, click **Show Log** to display Solutions Integration Service log files.
2. You can select any of the following **Optional Filters**:
 - **Line Number**: Specifies the number of lines that you want to display.
 - **String**: Specifies information that you want to find.
 - **Search Archive**: Searches all previous logs.
 - **Change Log Level**: Changes the type of logging that you want to keep in the log file. (For example, you can specify the parameters to save in the controller logs, service logs, domain class logs, grails logs, and third party logs.) you must have administrator credentials to change the log level.
3. Click **Submit**.

The log files are displayed, as shown in [Figure 8](#).

**Figure 8** Viewing the Solution Integration Service Log

Viewing audit logs

Audit logs provide information about important changes to the Storage Information System, including user creation and deletion, storage assignments, and parameter changes.

To view the Audit Log table:

1. In the **Solutions Integration Service Log** window, click **Get Audits**.
2. In the **Audit Table** window, click **Refresh**.

The **Audit Table** lists the following information for each log file:

- **Name:** The name of the action taken
- **Owner:** The module the action affected
- **Description:** A description of the action
- **Timestamp:** The time the action took place

3. Click **Cancel** to return to the **Solutions Integration Service Log** window.

Managing users

The Solutions Integration Service administrator can use the **Manage Users** feature to add or delete storage administrators and users. The storage administrator can grant or deny storage system access to this list of users, and control their access to specific types of storage within those storage systems. [“Controlling storage access” on page 27](#) provides more information about the storage administrator’s role.

Adding a new user or storage administrator

1. Log in to the Solutions Integration Service with system administrator credentials.
2. Click **Manage Users**.
3. The **List of Users** displays all existing users, as shown in [Figure 9](#).

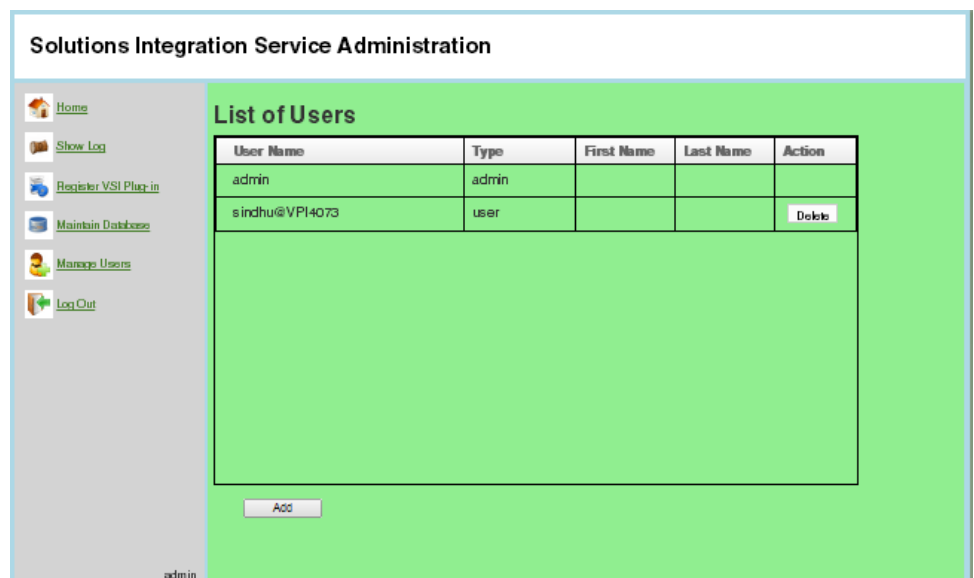


Figure 9 Viewing the Solutions Integration Service List of Users

4. Click **Add**.
5. From the **User Type** list box, select **User** or **Storage Admin**.
6. Type the values for the following parameters:
 - **User Name**
 - **First Name**
 - **Last Name**
 - **User Password**
 - **Confirm Password**
7. Click **Save**.
8. Click **OK**.

Deleting a user or storage administrator

Note: Before deleting storage administrators, ensure that they have deleted the all storage systems they own. These storage systems can not be managed from the Solutions Integrations Service after the storage administrator is deleted.

To delete a user or storage administrator:

1. Log in to the Solutions Integration Service with system administrator credentials.
2. Click **Manage Users**.

The **List of Users** window is displayed.
3. Next to the user that you want to delete, click **Delete**.
4. Click **OK**.

Maintaining the Solutions Integration Service database

The Solutions Integration Service database resides on the Solutions Integration Service vApp and contains active configurations, system information, and user setup information.

The Solutions Integration Service has a backup mechanism to protect the system from data loss or data corruption. For example, if a storage administrator accidentally deletes or incorrectly modifies the configuration data, the Solutions Integration Service administrator can restore it from a safe backup.

You can use the **Maintain Database** feature to view a list of available database backups, create new database backups, and restore the database from an available backup.

To use the **Maintain Database** feature:

1. Log in to the Solutions Integration Service with system administrator credentials.
2. Click **Maintain Database**.
3. Select one of the following operations:
 - **Do nothing:** No action will be taken.
 - **View Backup Files:** Shows a list of backups that were created.

- **Take Backup:** Creates a backup of the Solutions Integration Service database and saves it to a local system location, for example, your **Downloads** folder.
- **Restore from Backup:** Restores the database from the local copy on your computer.

To choose the file to restore, click **Choose File** and navigate to the backup file you want to use. Figure 10 shows an example. Backup files have the following naming format:

```
hercules_db_backup_v1-0-0-52_2013-08-08_15-16-17.sql
```

4. Click **Submit**.

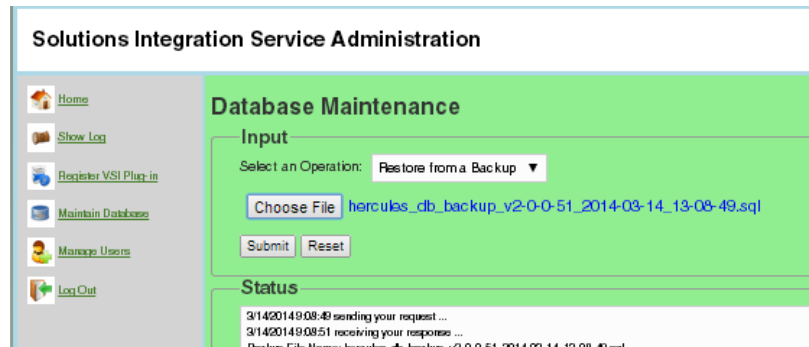


Figure 10 Restoring log files from a backup location

Controlling storage access

The **Storage Access Control** feature enables storage administrators to perform the following actions:

- ◆ On **ViPR**: Create and delete ViPR storage systems and add and delete users to/from the storage systems.
- ◆ On **VNX**: Create block and file storage, register DHSM users for compression and cloning on EMC storage systems, and add or remove users to/from storage pools.
- ◆ On **VMAX**: Create block storage, add users to storage pools, and assign thin pools to targeted users.

To view the **Storage Access Control** feature, log in to the Solutions Integration Service with storage administrator credentials.

The Solutions Integration Service displays your storage systems, as shown in [Figure 11](#).

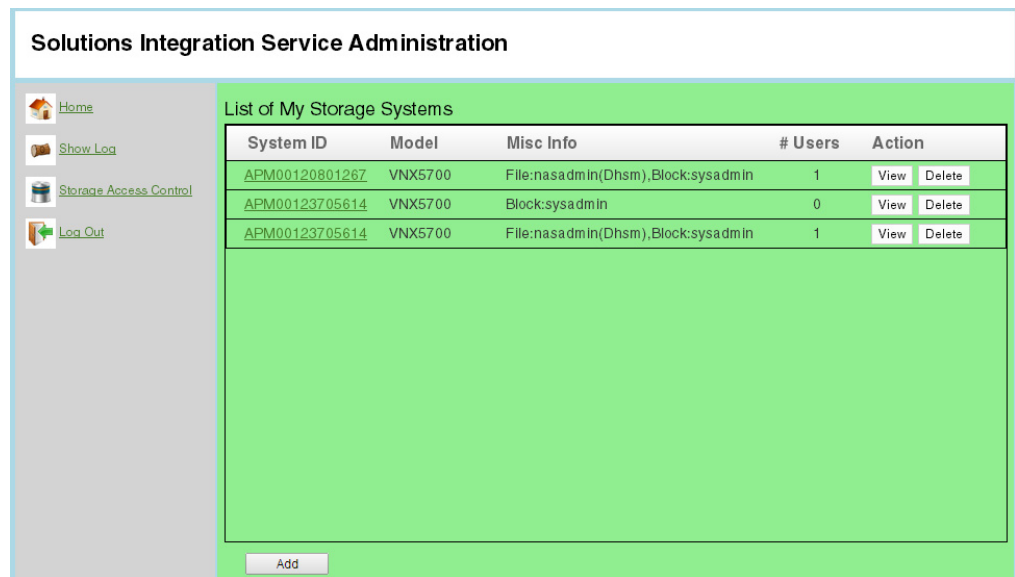


Figure 11 Storage Access Control Home window

From the **Storage Access Control** window, the storage administrator can:

- ◆ **View:** View storage system details and manage users.
For VNX and VMAX systems, you can manage storage pools for a particular system. Clicking **View** displays the Storage Pool Assignment page for the particular user where you can grant or remove individual file or block storage pool access. [“Managing users and storage pools for storage systems”](#) provides details.
- ◆ **Delete:** Delete a storage system.
- ◆ **Add:** Add a storage system. Follow the steps in [“Creating storage on ViPR” on page 31](#), [“Creating storage on VNX” on page 31](#), or [“Creating block storage on VMAX arrays” on page 32](#).

Managing users and storage pools for storage systems

Storage administrators can add or remove storage system and VNX storage pool users using the **Storage Access Control** feature. When the user logs in to the vSphere Web Client, the changes appear under **EMC VSI > Storage Systems**.

To manage users and storage pools:

- ◆ From the **Storage Access Control** window, click **View** next to the storage system that you want to manage.

The **Storage System Details** window appears, displaying system information and a list of current users. [Figure 12](#) shows a VNX storage system example.

Solutions Integration Service Administration

Storage System Details

System ID: APM00120801267 Model: VNX5700 Type: VNXBlock

File Info

Control Station IP:
Control Station user name:
DHSM user name:

Block Info

Storage Processor IP: 10.110.42.168
Unisphere user name: sysadmin

Current Users

Status	Username	First Name	Last Name	Action
✓	admin			Remove Storage Pool
✓	sAdmin	ss	aa	Remove Storage Pool
✓	user1	uu	11	Remove Storage Pool
✗	ryan@VPI4073			Add
✗	sindhu@VPI4073			Add
✗	user2	uu	22	Add

Save Cancel Sync Pools Remove All Add All Reset

Figure 12 Storage Access Control Storage System Details for a VNX storage system

Managing Storage System Details

You can perform the following actions for the storage system:

- ◆ Remove users: click **Remove** next to the username. Click **Remove All** to remove all current users.
- ◆ Add users: click **Add** next to the username. Click **Add All** to add all displayed users.
- ◆ Give users access to VNX or VMAX storage pools: click **Storage Pool** next to the username.

These changes are final when you click **Save**.

The buttons at the bottom of the window have the following actions:

- ◆ **Save**—Saves your settings. When the user logs in to the vSphere Web Client, the changes appear in the available storage pool list during provisioning.
- ◆ **Cancel**—Returns you to the **Storage System Details** page without saving any changes.
- ◆ **Sync Pools**—(VNX and VMAX only) Synchronizes the storage pool changes for the registered storage system. **Available GB** is updated to reflect the latest usage on the pool.
- ◆ **Add All**—Adds all displayed users to the storage system.
- ◆ **Remove All**—Removes all displayed users from the storage system.
- ◆ **Reset**—Resets all pending storage operations on the storage system to their previous settings.

VNX and VMAX Storage Pool Assignment

For VNX and VMAX storage systems, the following functions are available in the **Storage Pool Assignment** window:

- ◆ To manage storage pool assignment for users, click **Storage Pool** next to the username. The **Storage Pool Assignment for User** window appears, as shown in [Figure 13](#).

Integration Service Administration

Storage Pool Assignment for User: sAdmin

System ID: APM00120801267 Model: VNX5700 Type: VNXBlock

File Info

Control Station IP:
Control Station user name:
DHSM user name:

Block Info

Storage Processor IP: 10.110.42.168
Unisphere user name: sysadmin

Storage Pools

Status	Name	Description	Type	Avail GB	Action
✓	RAID Group 0		block	78.4609375	Remove
✓	Pool 0		block	5162.063	Remove
✓	RAID Group 1		block	0.0	Remove
✓	RAID Group 8		block	0.076171875	Remove
✓	Pool 1		block	17.033	Remove

Save Cancel Remove All Add All Reset

Figure 13 Managing storage pool assignment

In the list of storage pools, you can perform the following actions for the listed storage pools:

- **Remove**—Removes the current user from the storage pool. Click **Remove All** to remove the user from all listed storage pools.
- **Add**—Adds the current user to the storage pool. Click **Add All** to add the user to all listed storage pools.

These changes are final when you click **Save**.


The buttons at the bottom of the window have the following actions:

- **Save**—Saves your settings.
- **Cancel**—Returns you to the Storage System Details page without saving any changes.
- **Reset**—Resets all pending storage operations on the storage system to their previous settings.

Creating storage on ViPR

1. From the **Storage Access Control** window, click **Add**.
The **Create a Storage System** window appears.
2. From the **Storage System Type** select **ViPR**.
3. Type the ViPR IP address, username, and password.
4. Click **Save**, and then click **OK** in the confirmation dialog box.

Creating storage on VNX

You can create access credentials for block storage, file storage, or both on VNX arrays with the **Storage Access Control** feature. You can grant any user other than the storage array owner only one access credential on a VNX array. The credential can be file only, block only, or block plus file. Users who already have access to the array are designated with a yellow check mark  in the **Status** column of the **Current Users** list. To modify the credential, delete the current credential and create a new access credential.

To create storage on VNX:

1. From the **Storage Access Control** window, click **Add**.
The **Create a Storage System** window appears.
2. For **Storage System Type** select **VNX**.
3. To create block storage:
 - a. Under **Block (VMFS, RDM) Storage**, select **Register**.
 - b. Type the values for the following parameters:
 - **Storage Processor IP**
 - **Unisphere username**
 - **Unisphere password**
 - **Unisphere Scope (Global, Local, or LADP)**
4. To create file storage:
 - a. Under **File (NFS) Storage**, select **Register**.
 - b. Type the values for the following parameters:
 - **Control Station IP**
 - **Control Station Name**
 - **Control Station Password**
5. To register a DHSM username for compression and cloning, select **Register** and type the DHSM username and password in the text boxes provided.
6. Click **Save**.
7. Click **OK**.

Creating block storage on VMAX arrays

1. From the **Storage Access Control** window, click **Add**.
The **Create a Storage System** window appears.
2. In the **Storage System Type** select **VMAX**.
3. Type the values for the following parameters:
 - a. **SMI-S Provider Address**
 - b. **SMI-S Provider User Name**—A username with administrative credentials
 - c. **SMI-S Provider Password**
 - d. **VMAX System ID**—The system ID must be exactly as the SMI-S Provider reports it.
For example, 000195700917
4. Click **Save**.
5. Click **OK**.

CHAPTER 4

Using VSI to Access and Manage Storage

This chapter includes the following topics:

- ◆ Registering storage systems 34
- ◆ Managing storage systems 37

Registering storage systems

After enabling the Solutions Integration Service, you must register the storage systems that you want to view and manage with VSI. The following sections provide the procedures for registering EMC ViPR, EMC VNX, and EMC Symmetrix VMAX storage systems.

Registering a ViPR storage system

1. Select **Home** > **vCenter** > **EMC VSI** > **Storage Systems**.

The list shows the storage systems that are accessible from the Solutions Integration Service.

2. Select **Actions** > **Register Storage Systems**, as shown in [Figure 14](#).

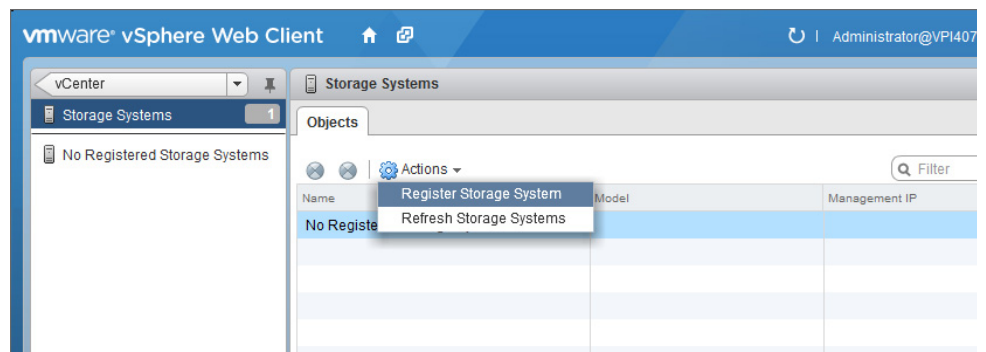


Figure 14 Registering a ViPR storage system

3. In the **Register EMC Storage System** window, enter values for the following parameters:

- **Storage System type:** Select the storage system type from the list.
- **Hostname or IP address:** Type the name or IP address of the storage system.
- **Username:** Type the account username.
- **Password:** Type the account password.

4. Click **OK**.

A confirmation dialog box appears, indicating the owner of the storage system, that is, the user who first registered it. The owner controls the storage system credentials.

Registering a VNX storage system

1. Select **Home** > **vCenter** > **EMC VSI** > **Storage Systems**.

The list shows the storage systems that are accessible from the Solutions Integration Service.

2. Select **Actions** > **Register Storage Systems**.

The **Register EMC Storage System** window appears, as shown in [Figure 15](#).

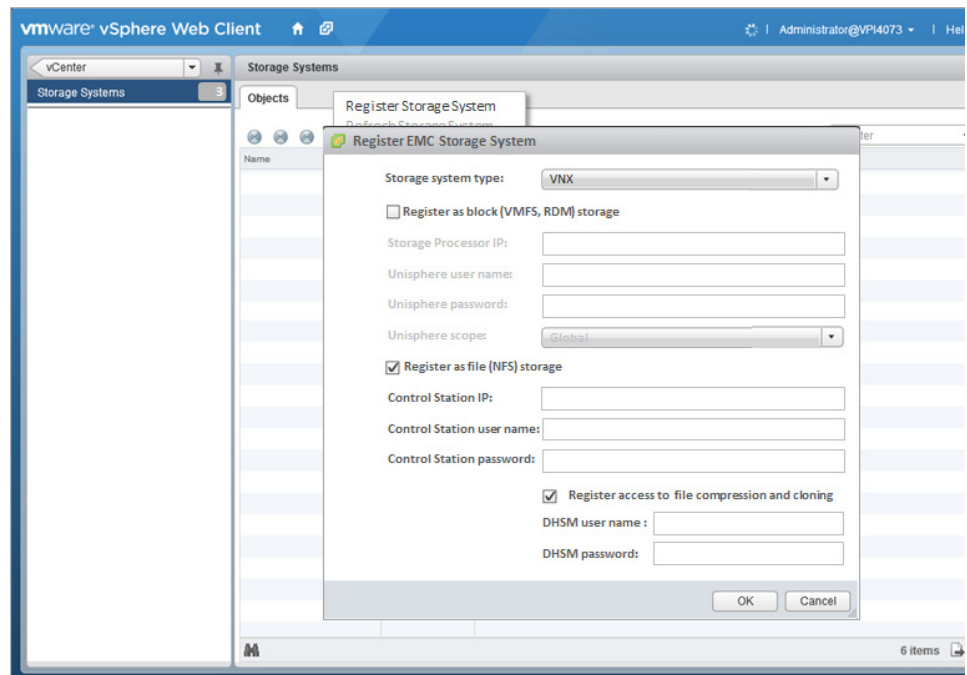


Figure 15 Registering a VNX storage system

3. In **Storage System Type**, select **VNX** to add a new storage definition.
4. Select storage credentials.

You can register the storage system as block, file, or both block and file.

Note: If both block and file credentials are specified, both credentials must point to the same VNX (same serial number). If the block and file credentials are valid but do not point to the same VNX system, you cannot register for both block and file.

To register as block storage:

- a. Select **Register as block (VMFS, RDM) storage**.
- b. Specify the following parameters:
 - **Storage Processor IP:** Type the storage processor IP address.
 - **Unisphere username:** Type the VNX block username.
 - **Unisphere password:** Type the VNX block password.
 - **Unisphere scope:** Select a scope (Global, Local or LDAP) for VNX block access.

To use LDAP authentication, type the username and select **LDAP** from the list box. Do not type the domain name as part of the username.

To register as file storage:

- a. Select **Register as file (NFS) storage**.
- b. Specify the following parameters:
 - **Control Station IP**

- **VNX Control Station username**

To use LDAP authentication, type the username in this format:
 <username>@<domain_name>

- **Control Station Password**

- c. Select **Register file access to compression and cloning**.
- d. Type the DHSM username and DHSM password in the designated boxes.
5. Click **OK**.

A confirmation dialog box appears, indicating the owner of the storage system, that is, the user who first registered it. The owner controls the storage system credentials.

Note: The registering of the storage system can take several minutes. When the registration is complete, the system appears in the storage list.

Registering a VMAX storage system

1. Select **Home > vCenter > EMC VSI > Storage Systems**.

The list shows the storage systems that are accessible from the Solutions Integration Service.

2. Select **Actions > Register Storage Systems**.

3. In the **Register EMC Storage System** dialog box:

- a. For **Storage System Type**, select **VMAX**.
- b. Type the SMI-S provider IP address or hostname, username, and password.
- c. Click **Retrieve Arrays**.

All VMAX storage arrays that are connected to the SMI-S provider are listed.

- d. Select the VMAX array that you want to add and click **OK**.

A confirmation dialog box appears, indicating the owner of the storage system, that is, the user who first registered it. The owner controls the storage system credentials.

To view the new storage array, select **Home > EMC VSI > Storage Systems**.

Unregistering a storage system

1. Select **Home > EMC VSI > Storage Systems**.
2. Select the array that you want to unregister.
3. Select **Actions > Unregister Storage Systems**.

Managing storage systems

After registering the storage systems, you can use the VSI plug-in to access and manage the storage systems.

Viewing a storage system

1. Select **Home > vCenter**.
2. In the inventory pane, select **EMC VSI > Storage Systems**.

When the page is fully loaded, the storage systems are displayed, as shown in [Figure 16](#).

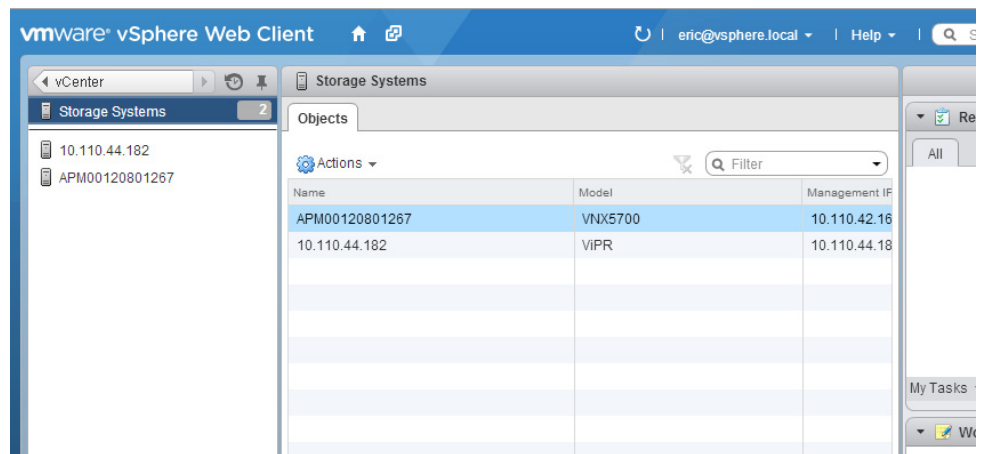


Figure 16 Viewing storage systems

Removing a storage system

1. Select **Home > vCenter > EMC VSI > Storage Systems**.
The list shows the storage systems that are accessible from the Solutions Integration Service.
2. Select **Actions > Unregister Storage Systems > Storage System Type**.
3. Select the storage system to be removed, and click **Unregister**.

CHAPTER 5

Managing ViPR Storage Systems Using VSI

This chapter includes the following topics:

- ◆ [About EMC ViPR](#) 40
- ◆ [Viewing properties of a ViPR storage system.....](#) 40
- ◆ [Provisioning storage on ViPR.....](#) 42

About EMC ViPR

EMC ViPR is a logical storage management platform that virtualizes a data center's physical storage infrastructure into shared pools of storage.

EMC ViPR storage allows developers and storage and cloud administrators to access all heterogeneous storage resources within a data center and manage them as a single large storage system. This platform provides a single storage control point within a data center.

Viewing properties of a ViPR storage system

1. Select **Home** > **vCenter** > **EMC VSI** > **Storage Systems**.
2. Select a storage system from the inventory list.

The following details of the ViPR storage system are displayed, as shown in [Figure 17](#).

- **Name:** The fully qualified domain name.
- **Model:** The type of storage system.
- **Management IP:** The IP address for the ViPR storage system.
- **More info:** Other information about the storage system.

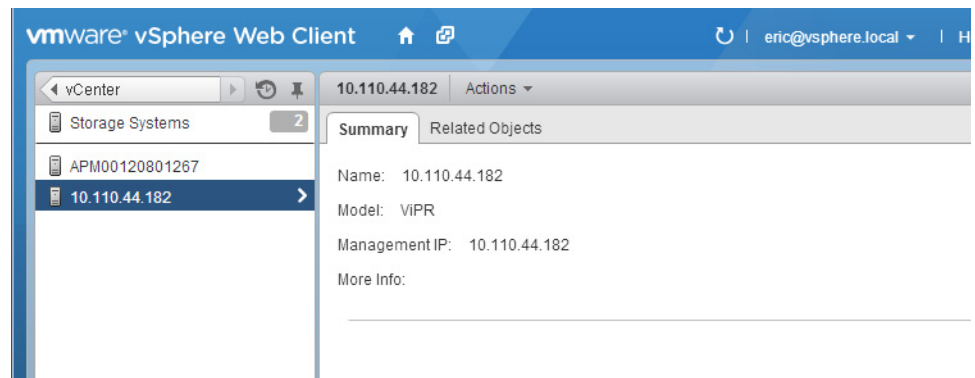


Figure 17 Viewing ViPR storage properties

Viewing properties of a ViPR NFS or VMFS datastore

1. Select **Home** > **vCenter** > **Inventory Lists** > **Datastores**.
2. Select the datastore name.

3. Click **Summary** to view the **Storage Device** and the **Storage System** details panes, as shown in [Figure 18](#).

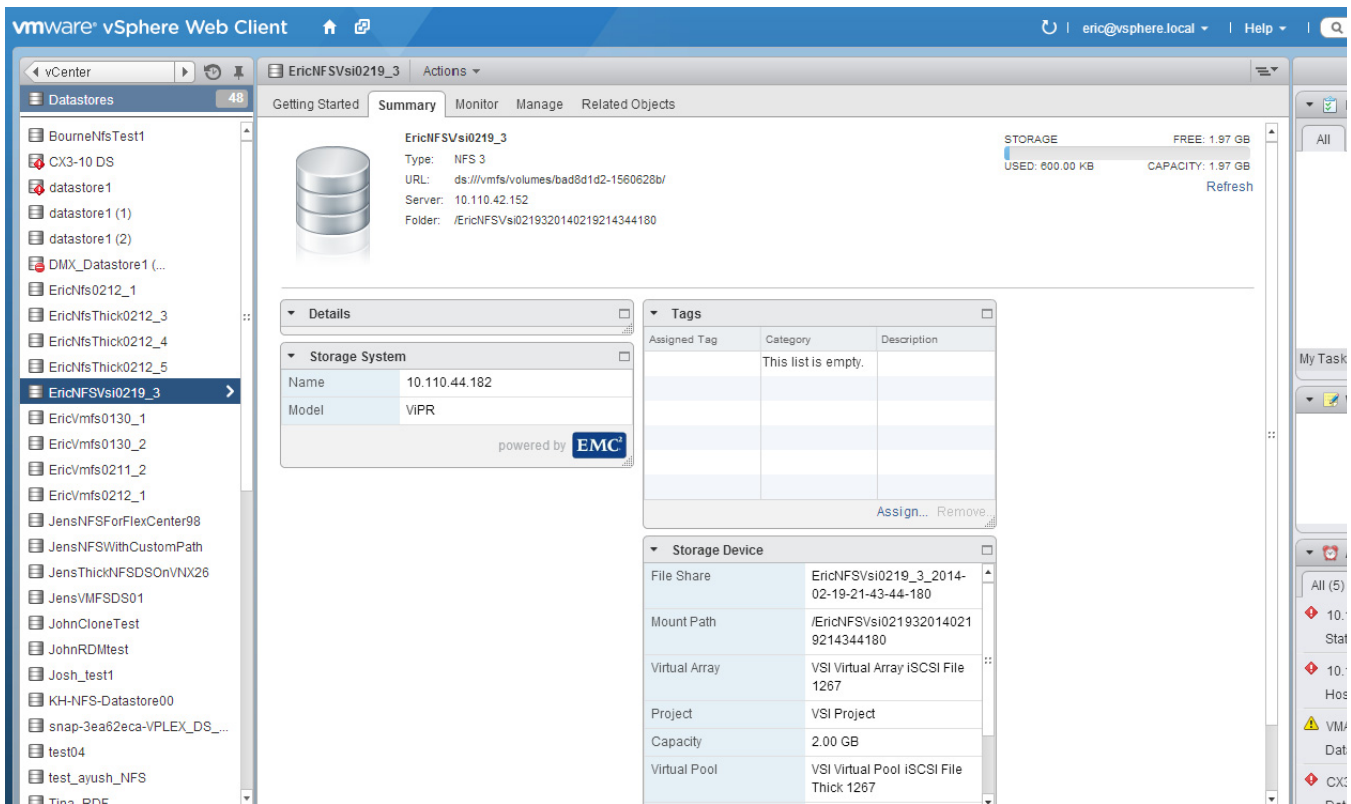


Figure 18 Viewing ViPR datastore properties

Viewing properties of a ViPR RDM volume

1. Select **Home > vCenter > Inventory Lists > Virtual Machines**.
2. Expand the directory and select the appropriate virtual machine.
3. Click **Monitor**.
4. Click **EMC Storage Viewer**.

5. Select the RDM disk, as shown in [Figure 19](#).

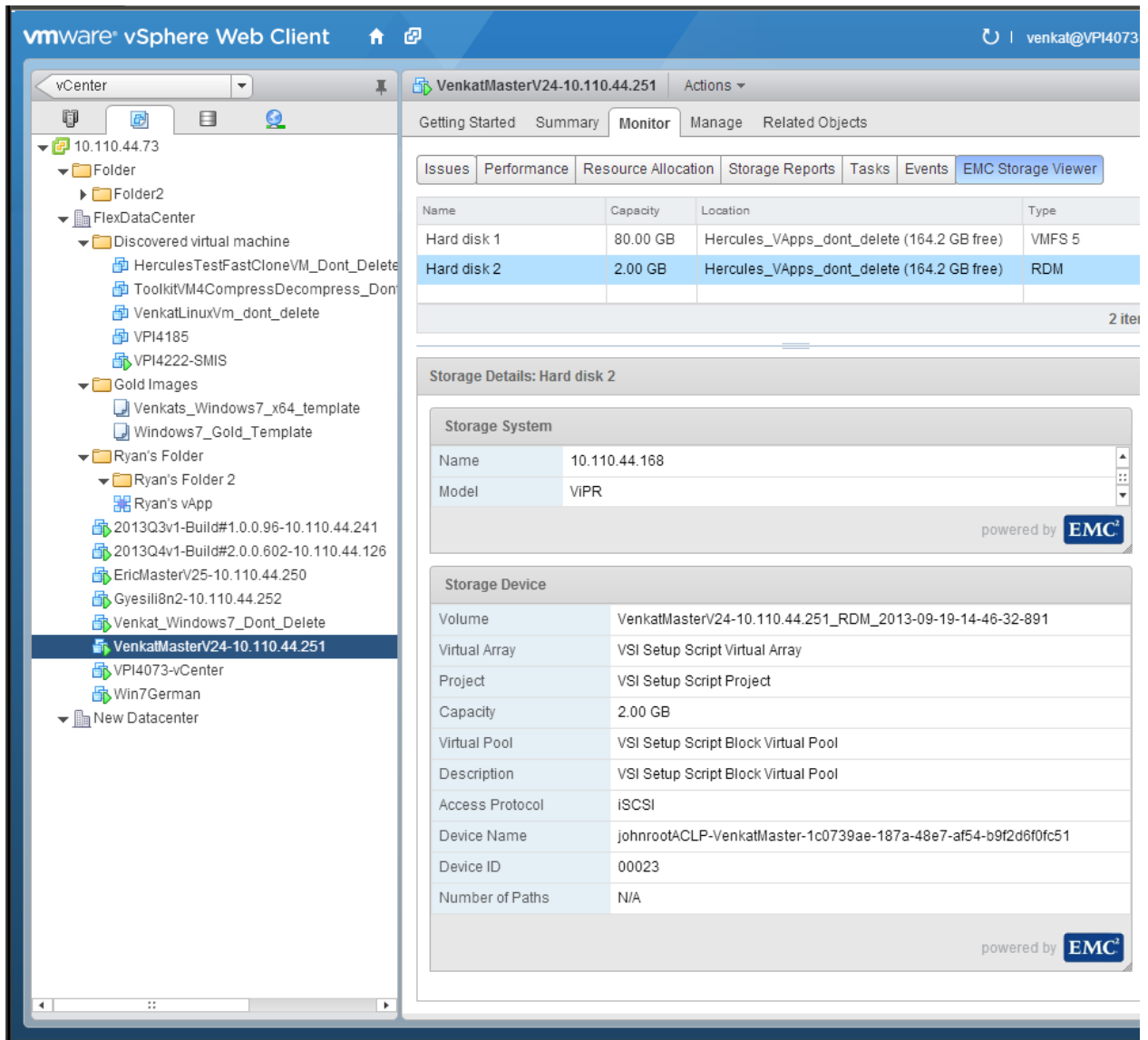


Figure 19 Viewing properties of a ViPR RDM disk

Provisioning storage on ViPR

You can provision the following ViPR storage objects:

- ◆ NFS datastore
- ◆ VMFS datastore
- ◆ RDM volume

Provisioning a ViPR NFS datastore

1. Select **Home** > **vCenter** > **Inventory Trees** > **Hosts or Clusters**.
2. Right-click the hostname or cluster name.

3. Click **All EMC VSI Plug-in Actions > New EMC Datastore**, as shown in [Figure 20](#).

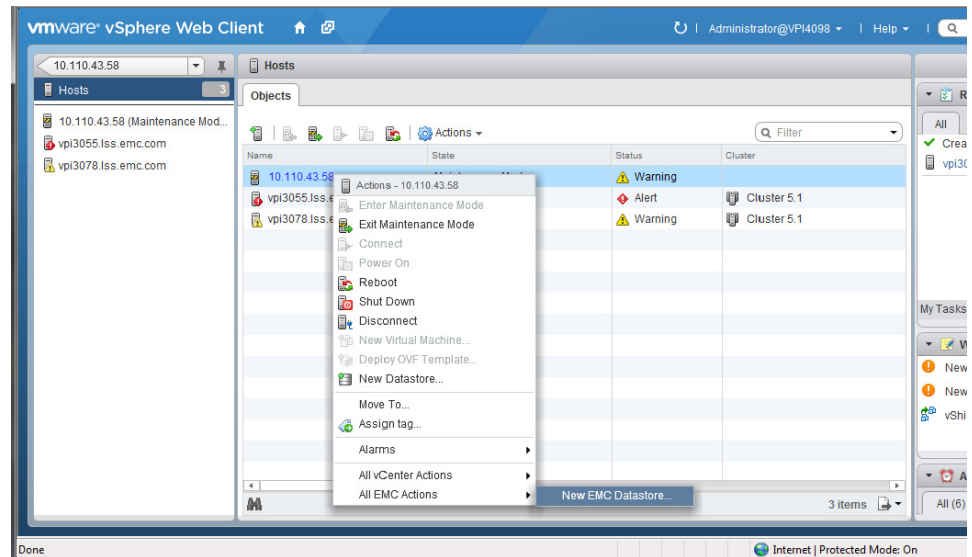


Figure 20 Provisioning a new EMC Datastore

4. In the New EMC Datastore dialog box, specify the values for each of the following parameters:

- **Name and location:** Type a name for the datastore.
- **Type:** Select **NFS**.
- **Array Selection:** Select from the list of file-capable arrays that are accessible to this VSI client.
- **Project Selection:**
 - **Project:** Select from the list of projects that are available on the array.
 - **Virtual Array:** Select from the list of virtual arrays.
 - **Select the hosts that require access to the datastore:** Select at least one of the host IP addresses that are listed.

Note: The host must be configured properly with an export group. If not, the host check box is unavailable. Contact your administrator to correct the export group settings.

- **Virtual Pool:** Select the virtual pool that provides the required level of access.
- **NFS Export Properties:**

Capacity: The maximum allowed capacity is the available capacity in the virtual pool. If the virtual pool does not specify the available capacity, Max : unknown is displayed.

5. Click **Next**.

The **Ready to Complete** dialog box displays a summary of your selections, as shown in [Figure 21](#).

General:	
Name	ViPR-NFS-DS-02
Type	NFS

Storage Details:	
Storage System	10.110.44.166
Storage System Type	ViPR
Virtual Array	VSI Virtual Array IP APM00120801267
Project	VSI Project
Capacity	100.00 GB
Virtual Pool	VSI Virtual Pool File Thin NFS APM00120801267
Description	VSI Virtual Pool File Thin NFS

Buttons: Back, Next, Finish, Cancel

Figure 21 New EMC Datastore Ready to Complete dialog box

- Click **Finish** to create the export and the datastore.

When the tasks are completed, a checkmark appears next to the **Create NAS datastore**.

Note: To refresh the task frame, click **My Tasks**, and then select **All Users Tasks**.

- To view the new datastore, select **Home > vCenter > Inventory Lists > Datastores > Summary**.

Provisioning a ViPR VMFS datastore

- Select **Home > vCenter > Inventory Lists > Hosts or Clusters**.
- Right-click the hostname or cluster name.
- Select **All EMC VSI Plug-in Actions > New EMC Datastore**.
- In the **New EMC Datastore** dialog box, specify a value for each of the following parameters:
 - Name and location:** Type a name for the datastore.
 - Type:** Select **VMFS**.
 - Array Selection:** Select from the list of block-capable arrays that are accessible to this client.
 - Project Selection:**
 - Project:** Select from the list of projects that are available on the array.
 - Virtual Array:** Select from the list of virtual arrays.

- **Select the hosts that require access to the datastore:** Select at least one of the host IP addresses that are listed.

Note: The host must be configured properly with an export group. If not, the host checkbox is unavailable. Contact your administrator to correct the export group settings.

- **Virtual Pool:** Select the virtual pool that provides the required level of access.
- **VMFS Version:** VMFS-5 or VMFS-3.
- **Volume Properties:**

Capacity: Type a number and select the measurement from the list box.

The window displays the maximum allowed capacity for the new export, which is the available capacity in the virtual pool. If the virtual pool does not specify the available capacity, Max: unknown is displayed.

5. Click **Next**.

The **Ready to Complete** dialog box displays a summary of your selections.

6. Click **Finish** to create the datastore.

When the tasks are completed, a checkmark appears next to the new datastore.

7. To view the new datastore, select **Home > vCenter > Inventory Lists > Datastores**.

Provisioning an RDM on ViPR

1. Select **Home > vCenter > Inventory Lists > Virtual Machines**.
2. Expand the directory to find the appropriate server.
3. Right-click the virtual machine name.
4. Select **All EMC VSI Plug-in Actions > New EMC RDM Disk**.
5. In the **New EMC RDM Disk** dialog box, specify the values for each of the following parameters:
 - **Array Selection:** Select a ViPR storage system from the list of arrays that are accessible to this client.
 - **Project Selection:**
 - **Project:** The name that identifies the application's storage resources. Select from the list of projects that are available on the array.
 - **Virtual Array:** The area of the network cloud where this project is a member. Select from the list of accessible virtual arrays.
 - **Virtual Pool:** Select the virtual pool that provides the required level of access.

Note: The virtual pool dictates the storage service capabilities for the ViPR data services (file, block, and object stores). Each virtual pool in the file, block, and object stores has a name (for example, "Gold") and a set of capabilities that describe the storage services that it offers.

- **Hard Disk Settings:**

- **Location:** Select the location for the new RDM.

Note: If the virtual machine is a VMFS datastore, you cannot store it with the virtual machine. Select a virtual machine that is an NFS datastore.

- **Compatibility mode:**

- **Physical** (default): Allows the guest operating system to access the hardware directly. Physical compatibility is useful if you are using SAN-aware applications on the virtual machine. However, a virtual machine with a physically compatible RDM cannot be cloned, made into a template, or migrated if the migration involves copying the disk.
- **Virtual:** Allows the RDM to behave like a virtual disk, so that you can use such features as taking snapshots, creating clones, and so on. When you clone the disk or create a template from it, the contents of the LUN are copied into a VMDK virtual disk file. Migrating a virtual compatibility mode RDM allows you to migrate the mapping file or copy the contents of the LUN to a virtual disk.

- **Shares:** Select the shares value. The shares value is the relative metric for controlling disk bandwidth. The values **Low**, **Normal**, **High**, and **Custom** are the sum of all shares on all the virtual machines that are on the host.

- **Limit - IOPS:** Enter the upper limit of IOPS that you want to allocate to the virtual machine, or select **Unlimited**.

- **Virtual Device Node:** Select any unassigned node.

- **Disk Mode:** If you selected **Virtual** for **Compatibility mode**, select the appropriate disk mode:

- **Dependent:** Disks are included in snapshots.
- **Independent - persistent:** Disks in persistent mode behave like conventional disks on your physical computer, that is, all data written to a disk is permanently on the disk.
- **Independent - nonpersistent:** Changes to disks in nonpersistent mode are written to and read from a redo log file that is deleted when you turn off or reset the virtual machine. With nonpersistent mode, you can restart the virtual machine with a virtual disk in the same state every time.

- **Volume Properties:**

Capacity: Specify the amount of storage.

The maximum allowed capacity for a new RDM is the available capacity in the virtual pool. If the virtual pool does not specify the available capacity, a message **Max: unknown** is displayed.

6. Click **Next**.

The **Ready to Complete** dialog box displays a summary of your selections.

7. Click **Finish** to create the datastore.

CHAPTER 6

Managing VNX Storage Systems Using VSI

This chapter includes the following topics:

◆ About EMC VNX storage systems	48
◆ VNX system requirements	48
◆ Viewing VNX storage properties.....	49
◆ Provisioning storage.....	50
◆ Compressing and decompressing storage system objects	55
◆ Enabling block deduplication	56
◆ Cloning virtual machines.....	57

About EMC VNX storage systems

The EMC VNX family of storage systems is a series of mid-range to high-end storage platforms that provide capabilities for both file storage (VNX operating environment (OE) for file) and block storage (VNX OE for block). The VNX2 series includes block deduplication and provides fully automated storage tiering for virtual pools (FAST™ VP) and FAST Cache.

VNX system requirements

The system must meet the following requirements for VNX:

- ◆ VNX for file:
 - VNX OE for file version 7.0 or later is installed.
 - All VNX Data Movers have VNX OE for file version 7.0 or later installed. To obtain the required software, contact EMC Customer Support.
 - NFS license is enabled.
 - Storage pool is created.
 - Network ports are configured.
 - Network connectivity exists between one or more Data Movers and ESX/ESXi servers.
 - Network connectivity exists between the Control Station and vSphere Client on port 22 (required to provision NFS storage).
 - Network connectivity exists between one or more Data Movers and vSphere Client on port 5080 (required to compress and clone virtual machines).
 - Network connectivity exists between the vCenter Server and vSphere Client.
 - DHSM is set up to use the compression and cloning features.
 - VNX for file maintains the following limit: Maximum file system size = 16 TB.
- ◆ VNX for block:
 - VNX OE for block version 05.31 or later is installed. To obtain the required software, contact EMC Customer Support.
 - A storage pool or RAID group is created.
 - Network ports are configured.
 - Network connectivity exists between one or more storage processors and ESX/ESXi servers.
 - Network connectivity exists between one or more storage processors and the vSphere Client on port 443 (required for provisioning VMFS datastores and RDM volumes and for setting tiering policies).
 - Network connectivity exists between the vCenter Server and vSphere Client.
 - Each ESX/ESXi host that will access block storage is connected to a storage group on the array.

Viewing VNX storage properties

You can view the properties for VNX storage objects, including datastores, virtual machines, and RDM volumes.

Viewing datastore and virtual machine clone properties

1. Select **Home** > **vCenter** > **Inventory Lists** > **Datastores** or **Virtual Machines**.
2. Select the object name.
3. Click **Summary** to view **Storage Device** and **Storage System** details, as shown in [Figure 22](#).

Note: For VMFS datastores on thin pool LUNs, the VSI properties show a different amount of used and free space than VMware shows in the **Storage Used** graphic on the right. This VMware UI component has no awareness of the added metadata stored on the pool with the LUN. VSI properties display the same numbers as EMC Unisphere® does on the VNX.

The screenshot shows the VMware vSphere Web Client interface. On the left, a tree view lists various datastores, with 'VNX-VMFS-DS-01' selected. The main panel displays the 'Summary' tab for this datastore. At the top, a storage icon and a progress bar show 'STORAGE' usage: 80.95 GB used, 418.80 GB free, out of a 499.75 GB capacity. Below this, two panels provide detailed information:

Storage System	
Name	APM00120801267
Model	VNX5700
powered by EMC	

Storage Device	
Device ID	53
Device Name	VNX-VMFS-DS-01
Device Type	Thin
Pool Name	Pool 0
Pool Type	Pool
FAST VP Policy	AutoTier
User Capacity	500.00 GB
Consumed Capacity	5.01 GB
Array Dedupe Feature	Not Supported
LUN Dedupe State	N/A
LUN Dedupe Status	N/A
powered by EMC	

Details		
Location	ds://vmfs/volumes/531ee521-779582ac-ed5a-30f70d47b5f2/	
Type	VMFS5	
Hosts	1	
Virtual machines	1	

Tags		
Assigned Tag	Category	Description
This list is empty.		

At the bottom of the Tags section, there are 'Assign...' and 'Remove' buttons.

Figure 22 Viewing VNX datastore Summary information

Viewing compression and RDM volume properties

1. Select **Home** > **vCenter** > **Inventory Lists** > **Virtual Machines**.
2. Select the object name.
3. Click **Monitor**.
4. Select **EMC Storage Viewer**, as shown in [Figure 23](#).

5. To see virtual machine properties, including compression properties, select the first virtual disk on the list.
6. To see RDM volume properties, select the appropriate subsequent virtual disk.

Note: If a VM is compressed, the VSI properties show a different amount of used and free space than VMware reports, since it has no awareness of the compression savings. VSI properties display the same compression savings as Unisphere does on the VNX.

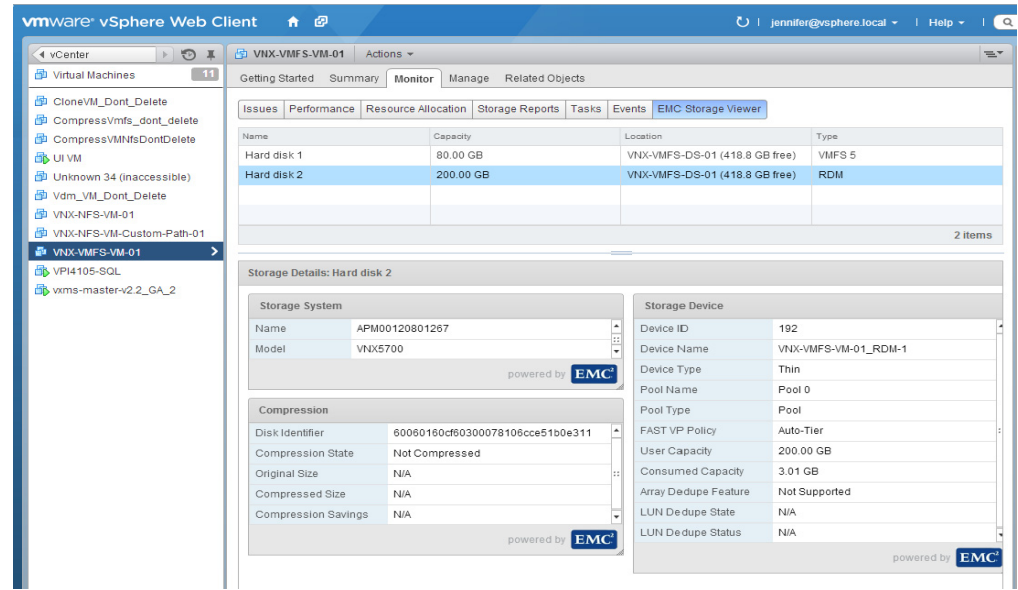


Figure 23 Viewing VNX RDM volume properties with EMC Storage Viewer

Provisioning storage

Storage provisioning prepares a NAS NFS, block VMFS file system, or block RDM volume for use by the ESX/ESXi servers. If you provision storage on a cluster, folder, or datacenter, then all hosts within the selected object will mount the newly provisioned NFS datastore, VMFS datastore, or RDM volume.

Provisioning a VNX NFS datastore

You can create a new NFS datastore or create a datastore from an existing NFS export.

To provision a VNX NFS datastore:

1. Select **Home > vCenter > Inventory Lists > Hosts or Clusters**.
You can expand the inventory list if necessary.
2. Right-click the object name.
3. Select **All EMC VSI Plug-in Actions > New EMC Datastore**.
4. Specify the parameters for each item in the **New EMC Datastore** dialog box, as follows:
 - **Name and location:** Specify a unique name for the datastore.
 - **Type:** Select NFS

- **Array Selection:** Select from the list of file-capable arrays that are accessible to the VSI client that you specified.
- **Data Mover Selection:**
 - **Select Data Mover:** Select from the list of Data Movers that are available on the array.
 - **Select Interface:** Select the IP address that you want to use.
 - **Select the hosts that require access to the datastore:** vCenter determines the host IP address that can be selected. Check a host IP address or domain name. You must select at least one.
- **Provisioning Action:**
 - **Create new NFS Export**
 - **Map Existing NFS Export**
- **Pool Selection:** Select from the storage pools that are available on the selected array.
- **NFS Export Properties:** Specify the parameters for the virtual pool.
 - **Initial capacity**
 - **Thin enabled:** Specifies that storage is allocated on a just-enough and just-in-time basis.
 - **Maximum capacity:** Specify the maximum capacity for the virtual pool. If **Thin enabled** is selected, **Maximum Capacity** is unavailable.
 - **Advanced:** Optionally, set the following parameters:
 - **Export path**
 - **Highwater mark**
 - **Direct Writes Enabled**
 - **No Prefetch**
 - **Virus Checking Enabled**
 - **Export to Subnet**
 - **Set Timeout Setting**

5. Click **Next**.

The **Ready to Complete** dialog box displays a summary of your selections, as shown in Figure 24.

New EMC Datastore

✓ 1 Name and Location
 ✓ 2 Type
 ✓ 3 Array Selection
 ✓ 4 Data Mover Selection
 ✓ 5 Provisioning Action
 ✓ 6 Pool Selection
 ✓ 7 NFS Export Properties
 ✓ 8 Ready to Complete

General:

Name	VNX-NFS-DS-03
Type	NFS

Storage System Information:

Storage System	APM00123705614
Storage System Type	VNX5700
Data Mover	server_2
Storage Pool	clarsas_archive
Initial Capacity	100.00 GB
Thin	Yes
Max Capacity	200.00 GB
Export Path	10.110.24.27/VNX-NFS-DS-03

Back Next Finish Cancel

Figure 24 New EMC Datastore Ready to Complete dialog box

- Click **Finish** to create the export and the datastore.

When the tasks are completed, a check appears next to **Create NAS datastore**.

- To view the new datastore, select **Home > vCenter > Datastores > Summary**.

Provisioning a VNX VMFS datastore

- Select **Home > vCenter > Inventory Lists > Hosts or Clusters**.
Expand the inventory list to view nested items.
- Right-click the object name.
- Select **All EMC VSI Plug-in Actions > New EMC Datastore**.
- Specify the parameters in the **New EMC Datastore** dialog box for each of the following items:
 - Name and location:** Specify a name for the datastore.
 - Type:** select **VMFS**.
 - Array Selection:** Select from the list of block-capable arrays that are accessible to this VSI client.
 - Project Selection:**
 - Project:** Select from the list of projects that are available on the selected array.
 - Virtual array:** Select from the list of virtual arrays.
 - Select the hosts that require access to the datastore:** Select at least one host from the list of IP addresses that vCenter provides.
 - Virtual pool:** Select the virtual pool that provides your required level of access.

- **VMFS Version:** Select **VMFS-5** or **VMFS-3**.

- **Datastore Properties:**

Capacity: The maximum allowed capacity for new export is the available capacity in the virtual pool. If the virtual pool does not specify the available capacity, **Max : unknown** is displayed.

5. Click **OK**.

The **Ready to Complete** dialog box displays a summary of the sections that you specified.

6. Click **Finish** to create the datastore.

When the tasks are complete, a check mark appears next to the new datastore.

7. To view the new datastore, select **Home > vCenter > Inventory Lists > Datastores**.

Provisioning an RDM volume on VNX

1. Select **Home > vCenter > Inventory Lists > Virtual Machines**.

2. Expand the directory and right-click the applicable virtual machine name.

3. Select **All EMC VSI Plug-in Actions > New EMC RDM Disk**.

4. In the **New EMC RDM Disk** dialog box, specify the values for each of the following parameters:

- **Array Selection:** Select a VNX storage array from the list of arrays.
- **Storage Pool Selection:** Select the storage pool with the required level of access.
- **Hard Disk Settings:**
 - **Location:** Select the location for the new RDM.
 - **Compatibility mode:**
 - **Physical** (default): Allows the guest operating system to access the hardware directly. Physical compatibility is useful if you are using SAN-aware applications on the virtual machine. However, a virtual machine with a physical compatibility RDM cannot be cloned, made into a template, or migrated if the migration involves copying the disk.
 - **Virtual:** Allows the RDM to behave like a virtual disk, so that you can use such features as creating snapshots, cloning, and so on. When you clone the disk or make a template from it, the contents of the LUN are copied into a VMDK virtual disk file. When you migrate a virtual compatibility mode RDM, you can migrate the mapping file or copy the contents of the LUN to a virtual disk.
 - **Shares:** Select the shares value. The shares value represents the relative metric for controlling disk bandwidth. The values Low, Normal, High, and Custom are compared to the sum of all shares of all the virtual machines that are on the host.

- **Limit - IOPS:** Enter the upper limit of storage resources to allocate to the virtual machine, or select **Unlimited**.
This value is the upper limit of I/O operations per second allocated to the virtual disk.
- **Virtual Device Node:** Select any node that is unassigned.
- **Disk Mode:** If you selected Virtual for the **Compatibility mode**, Select the desired disk mode:
 - **Dependent:** Disks are included in snapshots
 - **Independent - persistent:** Disks in persistent mode behave like conventional disks on your physical computer. All data written to a disk in persistent mode is written permanently to the disk
 - **Independent - nonpersistent:** Changes to disks in nonpersistent mode are discarded when you turn off or reset the virtual machine. With nonpersistent mode, you can restart the virtual machine with a virtual disk in the same state every time. Changes to the disk are written to and read from a redo log file that is deleted when you turn off or reset the virtual machine

- **Volume Properties:**

- **Preferred LUN ID:**
- **Default Owner:** Auto, SP A, SP B
- **Capacity:** Specify the amount of storage.
The maximum allowed capacity for the new RDM is the available capacity in the virtual pool. If the virtual pool does not specify the available capacity, Max-unknown is displayed.

- **Thin:**

- **Advanced:**

Tiering Policy:

- **Start High then Auto-Tier (Recommended)**
- **Auto-Tier**
- **Highest Available Tier**
- **Lowest Available Tier**

5. Click **Next**.

The **Ready to Complete** dialog box displays a summary of the settings.

6. Click **Finish**.

Compressing and decompressing storage system objects

You can use the VNX **Compress** and **Decompress** functions to compress and decompress the system objects listed in [Table 5](#).

Table 5 Result of compressing objects in vSphere

Object	Result
Virtual machine	The virtual machine is compressed.
Host	All virtual machines on the host are compressed.
Cluster	All virtual machines in the cluster are compressed.
Pool	All virtual machines in the pool are compressed.
Datastore	All virtual machines in the datastore are compressed.
Folder	All virtual machines and datastores in the folder are compressed.
Data center	All virtual machines in the data center are compressed.

Technical Notes

- ◆ For block compression, you can compress a datastore if it resides on a VNX block pool LUN.
- ◆ For file compression:
 - The compression operation fails if you do not have valid file and DHSM credentials for the VNX array. [“Controlling storage access” on page 27](#) and [“Registering storage systems” on page 34](#) provide more information about registering storage.
 - You can compress any virtual machine disk that resides on VNX file storage that is registered to VSI with DHSM credentials, as long as the virtual machine is neither a fast clone nor a fast clone parent.
 - When you add a virtual disk to a compressed virtual machine, it is not compressed because the compression operation occurred before you added the new disk. Repeating the compression operation on the virtual machine compresses any new, uncompressed virtual disks, skipping any virtual disks that are already compressed.
 - For best performance, enable caching on the file system where you are performing compress operations.
 - If the VNX File Deduplication (compression) feature is turned off for the datastore on which the compression operation is executed, VSI automatically sets deduplication to the suspended mode. The suspended mode allows individual compression operations to execute, but does not deduplicate the other objects on the datastore.
 - You can use virtual machine compression when archiving gold image virtual machines. You cannot compress a virtual machine that has or has had working fast clones. To do this, create a copy of the virtual machine by cloning the master virtual machine. Now you can compress and archive it.

- Compressing a virtual machine decreases its size on the disk. If you compress a host, cluster, folder, datastore, or data center, then the NAS platform compresses the VMDK files associated with all virtual machines within the selected object. The feature does not compress VSWP files.

Compressing a virtual machine on a file system

You can compress and decompress virtual machines that are stored on VNX file systems. The **Compress** function is available only for uncompressed virtual machines that are not fast clones or version files. The **Decompress** function is available only for compressed virtual machines.

To compress or decompress a virtual machine, it must meet the following criteria:

- ◆ Hard Disk 1 is stored on an NFS datastore that resides on a VNX array.
- ◆ The NFS datastore is on a registered VNX array that includes valid file and DHSM credentials.

An error message `Operation not supported for selected virtual machine` is displayed if you try to compress a virtual machine that does not meet these criteria.

To compress a virtual machine:

1. Select **Home** > **vCenter** > **Inventory Lists** > **Virtual Machines** and expand the directory.
2. Right-click the virtual machine name.
3. Select **All EMC VSI Plug-in Actions** > **Compress**.
4. The space usage before and after compression is displayed under **Summary**.

Compressing a block datastore

To compress a datastore that resides on a VNX block pool LUN:

1. Select **Home** > **vCenter** > **Inventory Lists** > **Datastores** and expand the directory to find the applicable datastore.
2. Right-click the datastore name.
3. Select **All EMC VSI Plug-in Actions** > **Compress**.

Enabling block deduplication

VSI supports block deduplication on VNX2 systems. You can enable or disable block deduplication at the feature, pool, or LUN level on a VNX array. The following actions are available:

- ◆ **Enable block deduplication:** Applies deduplication on all virtual machines, one by one, that reside on the selected object.
- ◆ **Disable block deduplication:** Disables block deduplication on all virtual machines, one by one, that reside on the selected object.

The following restrictions apply:

- ◆ Deduplication is available only for pool LUNs on a system that has the deduplication feature enabled.

- ◆ You can enable either deduplication or compression, but not both.
- ◆ If you enable or disable deduplication on a pool LUN that has VNX snapshots associated with it, all snapshots are deleted when the operation is completed.
- ◆ You cannot set tiering policies for a deduplicated LUN.
- ◆ You can report savings from deduplication at the pool level but not at the LUN level.

Deduplication prerequisites

Before you can enable deduplication, prepare your environment as follows:

1. Create a VNX block storage array.
2. Create a datastore by provisioning storage on a host:
 - Storage Type: **LUN**
 - Storage Array: *<array created in Step 1>*
 - Storage Pool: **Pool**
 - File System Version: **VMFS-3** or **VMFS-5**
 - Datastore Type: **VMFS**
3. Create the virtual machine by selecting the datastore you created in Step 2.

Enabling deduplication

To enable deduplication on various objects, including datastores, virtual machines, hosts, host clusters, datacenters, and folders:

1. Right-click the object and select **All EMC VSI Plugin Actions > Enable Deduplication**.
2. In the confirmation dialog box, click **Yes** to acknowledge that any array-based snapshots will be deleted.

This action applies deduplication on all virtual machines, one by one, that reside the selected object.

Disabling deduplication

You can disable deduplication as follows on various objects, including datastores, virtual machines, hosts, host clusters, datacenters, and folders:

1. Right-click the object and select **All EMC VSI Plugin Actions > Disable Deduplication**.
2. In the confirmation dialog box, click **Yes**.

This action applies reduplication on all virtual machines, one by one, that reside the selected object.

Cloning virtual machines

This section describes the fast clone and full clone operations for virtual machines.

- ◆ **Cloning a virtual machine with fast clone operations:** Creates a file-based snapshot of a virtual machine that maintains a relationship with its parent virtual machine

- ◆ **Cloning a virtual machine with full clone operations:** Creates a complete and independent copy of a virtual machine

About fast clones

Fast clone is a NAS feature that creates a file-based snapshot of a virtual machine that maintains a relationship with its parent virtual machine.

Notes:

- ◆ Once a virtual machine has fast clones, it can no longer be compressed. Fast clones are created in the same NFS datastore as the parent virtual machine.
 - ◆ You can create fast clones only from uncompressed virtual machines. VSI automatically decompresses a compressed virtual machine before creating the fast clone.
 - ◆ The fast clone operation fails if the storage administrator does not provide DHSM credentials.
-

Known issues for creating fast clones

- ◆ You cannot create a fast clone of a virtual machine that is a fast clone itself.
- ◆ You can create fast clones of a gold image virtual machine only when it is on the same file system. Fast cloning across file systems is not supported.
- ◆ You cannot delete a gold image virtual machine that has fast clones. Using the **Delete from Disk** option in vCenter on a virtual machine of this nature simply removes the virtual machine from inventory; the VMDK file associated with the virtual machine is retained and all other files (for example SWAP, VMX, and so on) are deleted.
- ◆ You cannot compress a master virtual machine that has fast clones.
- ◆ You cannot create a fast clone on a compressed virtual machine. If you do so, VSI decompresses the virtual machine before continuing with the cloning operation.

About full clones

The full clone feature creates a complete and independent copy of a virtual machine.

Note: The full clone operation fails if the storage administrator does not provide DHSM credentials.

Known issues for creating full clones

- ◆ You can create full clones only to file systems on the same Data Mover.
- ◆ File systems with auto extend enabled will automatically be extended during the full clone task if space runs out.

Creating clones of virtual machines

1. Select **Home > vCenter > Inventory Lists > Virtual Machines**.
2. Expand the directory to find the appropriate server.

3. Right-click the virtual machine name.
4. Select **All EMC VSI Plug-in Actions > EMC Clone**.

Cloning is available only for virtual machines that meet the following criteria:

- The virtual machine has only one virtual disk.
 - The virtual machine is on an NFS datastore that resides on a registered VNX array with valid file and DHSM credentials.
 - The virtual machine is not a fast clone.
5. In the **ECM Clone Existing Virtual Machine** dialog box, for **Select the base name and folder**:
 - a. Enter a base name for the clone.
 - b. Select a destination folder or a virtual machine for the cloned virtual machine.
 - c. Click **Next**.
 6. For **Select a compute resource**:

You must select a valid compute resource. If the source datastore is not available on the selected hosts, the warning message, *Fast clone option for this virtual machine is not available on the selected compute resource's datastores* appears. See the **Compatibility** frame to help determine the problem.

7. Specify the details for **Select Clone Options**:

- **Clone Count:** Select the number of clones to be created.

Max is the maximum number of clones that can be created as determined by the number of CPU cores that are on the selected destination.

Default = 12 virtual machines per core.

Note: If you create one clone, the name is the clone name you specify. If you create multiple clones, they are numbered. For example, if you specified four leading zeroes on the index, virtual machine X would have clones called X00001, X00002, X00003, and so on.

- **Clone type:** Select Fast clone or Full clone.

Note: If the compute resource does not have access to the datastore that is hosting the source virtual machine, you can create only full clones.

- **Generated Clone Name:** Type a name for the clone.
- **Add Leading Zeroes to Index:** Indicate whether the clones will have leading zeroes in the file names.
- **Number of Digits in Index:** Specify the total number of digits to append to the end of the clone name.
- **Customization Specification:** Select customized definitions from the customization specifications manager.

- **Power on virtual machines after creation:** Select to automatically power on the virtual machine clones.
8. Do one of the following:
 - For fast clones, go to [Step 9](#).
 - For full clones, in **Select storage**, specify the datastore for the full clone.
The datastore that you select must meet the following criteria:
 - The destination datastore must have available space that is larger than the number of clones multiplied by the size of the source virtual machine's files.
 - The destination datastore must reside on the same array and same Data Mover as the source datastore.
 9. Click **Next**.
 10. In the **Ready to complete** dialog box, verify the details, and then click **Finish**.

CHAPTER 7

Managing VMAX Storage Systems Using VSI

This chapter includes the following topics:

- ◆ [About EMC Symmetrix VMAX storage systems](#) 62
- ◆ [Viewing VMAX storage properties](#) 62
- ◆ [Provisioning storage.....](#) 63

About EMC Symmetrix VMAX storage systems

EMC Symmetrix VMAX storage systems provide high levels of performance, availability, and intelligence in the enterprise virtual data center. VMAX systems incorporate a scalable virtual matrix architecture, which supports Flash drives, Fibre Channel (FC) drives, SATA, and Near-Line SAS (NL-SAS) drives within a single array, as well as a wide range of RAID types.

You can view the properties for VMAX storage objects, including datastores, hosts, clusters, RDM volumes, and virtual machines by following the steps in this section.

Viewing VMAX storage properties

1. Select **Home** > **vCenter** > **Inventory Lists** > **Datastores**.
2. Select the datastore name.
3. Select **Summary** to view **Storage Device** and **Storage System** details, as shown in [Figure 25](#).

The screenshot displays the VMware vSphere Web Client interface. The left sidebar shows the 'Datastores' list with 37 items. The main content area shows the 'Summary' tab for the 'VMAX40K-DS1' datastore. The 'Storage System' section shows the Name '000195700516' and Model 'VMAX40K', powered by EMC. The 'Storage Device' section shows the Device ID '00641', Device Name 'Volume 00641', Device Type 'TDEV', WWN '60000970000195700516533030363431', Raid Level 'RAID-5 (3+1)', Is Thin Provisioned 'true', Is Meta Volume 'true', Block Size '512 bytes', Total Capacity '200.00 GB', and Used Capacity '28 MB', also powered by EMC. The 'Details' section shows the Location 'ds:///vmfs/volumes/50801726-03366497-c5f4-e8b748d5d700/', Type 'VMFS5', Hosts '1', and Virtual machines '0'. The 'Tags' section is empty.

Figure 25 Viewing VMAX storage properties

Viewing VMAX RDM volume properties

1. Select **Home** > **vCenter** > **Inventory Lists** > **Virtual Machines**.
2. Expand the directory and select the appropriate virtual machine.
3. Select **Monitor** > **EMC Storage Viewer**.

Provisioning storage

Storage provisioning prepares a block VMFS file system or block RDM volume for use by the ESX/ESXi servers. You can provision VMFS datastores at the host or cluster level. However, you can create RDMs only at the virtual machine level.

Provisioning a VMAX VMFS datastore

1. Select **Home** > **vCenter**.
2. Under **Inventory List**, select **Hosts** or **Clusters**. Expand the inventory list if necessary.
3. Right-click the hostname or cluster name.
4. Select **All EMC VSI Plugin Actions** > **New EMC Datastore**.
5. In the **New EMC Datastore** dialog box, specify the parameters for each of the following items, and click **Next**:

- **Name and location:** Specify a name for the datastore.
- **Type:** Select **VMFS**. VMAX supports only VMFS datastores.
- **Array Selection:** Select the VMAX storage array where you want to create the LUN.
- **Storage Pool Selection:** Select the storage pool with the required level of access.
- **Masking View Selection:** Select the hosts that require access to the datastore.

A masking view is a collection of a storage group, a port group, and an initiator group that defines to which host the datastore is presented. vCenter determines the host IP addresses that can be selected. You must select a single masking view; you cannot make multiple selections.

Note: VSI 6.1 does not support cascaded storage groups. If you select a masking view that contains a cascaded storage group, the provisioning task fails. Cascaded initiator groups are supported and appear in the **Masking View Selection** pane.

- **VMFS Version:** Select **VMFS 5** or **VMFS 3**
 - **VMFS 5** enables a LUN capacity between 2 TB and 64 GB and has a 1 MB file block size.
 - **VMFS 3** supports up to a 2 TB LUN. Available block sizes are 1MB, 2 MB, 4 MB, and 8 MB.

- **Datastore Details:**

Capacity: The maximum capacity for the storage pool. If the storage pool capacity is unlimited, the maximum capacity is related to the VMFS version you select. If you select VMFS 5, the maximum capacity is 64 TB; if you select VMFS 3, the maximum capacity is 2 TB.

Meta Volume Type: If you select a capacity greater than 240 GB, the **Meta Volume Type** option is enabled. Select **Concatenated** or **Striped**.

6. Click **OK**.

The **Ready to Complete** dialog box displays a summary of the specifications, as shown in [Figure 26](#).

General:	
Name	stp EMC Datastore
Type	VMFS 5

Storage Details:	
Storage System	000195900806
Array Type	VMAX10K
Masking View	vpi3165_view
Expose to Hosts	10.110.43.165
Capacity	241.00 GB
Storage Pool	USM_RAID5
Meta Volume Type	Concatenated

Buttons: Back, Next, Finish, Cancel

Figure 26 New EMC Datastore Ready to Complete dialog box for a VMAX VMFS datastore

7. Click **Finish** to create the datastore.

When the tasks are complete, a check mark appears next to the new datastore.

8. To see the new datastore, select **Home > vCenter > Inventory Lists > Datastores**.

Provisioning an RDM volume on VMAX

1. Select **Home > vCenter > Inventory Lists > Virtual Machines**.
2. Expand the directory and right-click the applicable virtual machine name.
3. Select **All EMC VSI Plugin Actions > New EMC RDM Disk**.
4. In the **New EMC RDM Disk** dialog box, specify the values for each of the following parameters:
 - **Array Selection:** Select a VMAX storage array from the list.
 - **Storage Pool Selection:** Select a storage pool where the new volume resides.

Note: The list shows only storage pools that you have access to. Refer to [“Managing users”](#) for details.

- **Masking View Selection:** Select a masking view for the new volume.

Note: VSI 6.1 does not support cascaded storage groups. If you select a masking view that contains a cascaded storage group, the RDM creation task fails. Cascaded initiator groups are supported and appear in the **Masking View Selection** pane.

- **Hard Disk Settings:**
 - **Location:** Select the location for the new RDM.
 - **Compatibility mode:**
 - **Physical** (default): Allows the guest operating system to access the hardware directly. Physical compatibility is useful if you are using SAN-aware applications on the virtual machine. However, a virtual machine with a physical compatibility RDM cannot be cloned, made into a template, or migrated if the migration involves copying the disk.
 - **Virtual:** Allows the RDM to behave like a virtual disk, so that you can use such features as creating snapshots, cloning, and so on. When you clone the disk or make a template from it, the contents of the LUN are copied into a VMDK virtual disk file. When you migrate a virtual compatibility mode RDM, you can migrate the mapping file or copy the contents of the LUN to a virtual disk.
 - **Shares:** Select the shares value. The shares value is the relative metric for controlling disk bandwidth. The values Low, Normal, High, and Custom are the sum of all shares of all the virtual machines that are on the host.
 - **Limit - IOP:** Enter the upper limit of IOPS to allocate to the virtual machine, or select **Unlimited**.
 - **Virtual Device Node:** Select any unassigned node.
 - **Disk Mode:** If you selected **Virtual** for the **Compatibility mode**, select the appropriate disk mode:
 - **Dependent:** Disks are included in snapshots.
 - **Independent - persistent:** Disks in persistent mode behave like conventional disks on your physical computer. All data written to a disk in persistent mode is written permanently to the disk.
 - **Independent - nonpersistent:** Changes to disks in nonpersistent mode are discarded when you turn off or reset the virtual machine. With nonpersistent mode, you can restart the virtual machine with a virtual disk in the same state every time. Changes to the disk are written to and read from a redo log file that is deleted when you turn off or reset the virtual machine.

- **Volume Properties:**

Capacity: Specify the amount of storage.

The maximum allowed capacity for new RDM is the available capacity in the virtual pool.

Note: If the virtual pool does not specify the available capacity, Max : unknown is displayed.

Meta Volume Type: When the capacity is larger than 240 GB, select either **Concatenated** or **Striped**.

5. Click **Next**.

The **Ready to Complete** dialog box displays a summary of the settings.

6. Click **Finish** to create the datastore.

CHAPTER 8

Troubleshooting

This chapter includes the following topics:

- ◆ [Viewing log files.....](#) 68

Viewing log files

Use the log files to help determine the cause of failures. You can view the VSI or Solutions Integration Service log files using either the vSphere Web Client or the vSphere Client for Windows.

Viewing log files with the web client

To view VSI or Solutions Integration Service log files:

1. From the vSphere Web Client, select **Home** > **vCenter** > **EMC VSI** > **Solutions Integration Service**.
2. Click **VSI Server**.
3. Select **Monitor**.
4. Select **VSI log browser** or **Solutions Integration Service browser**.

Figure 27 shows an example of the VSI Log Browser.

5. Click **Refresh** to view the log entries.
6. To save the log file, click **Export**.

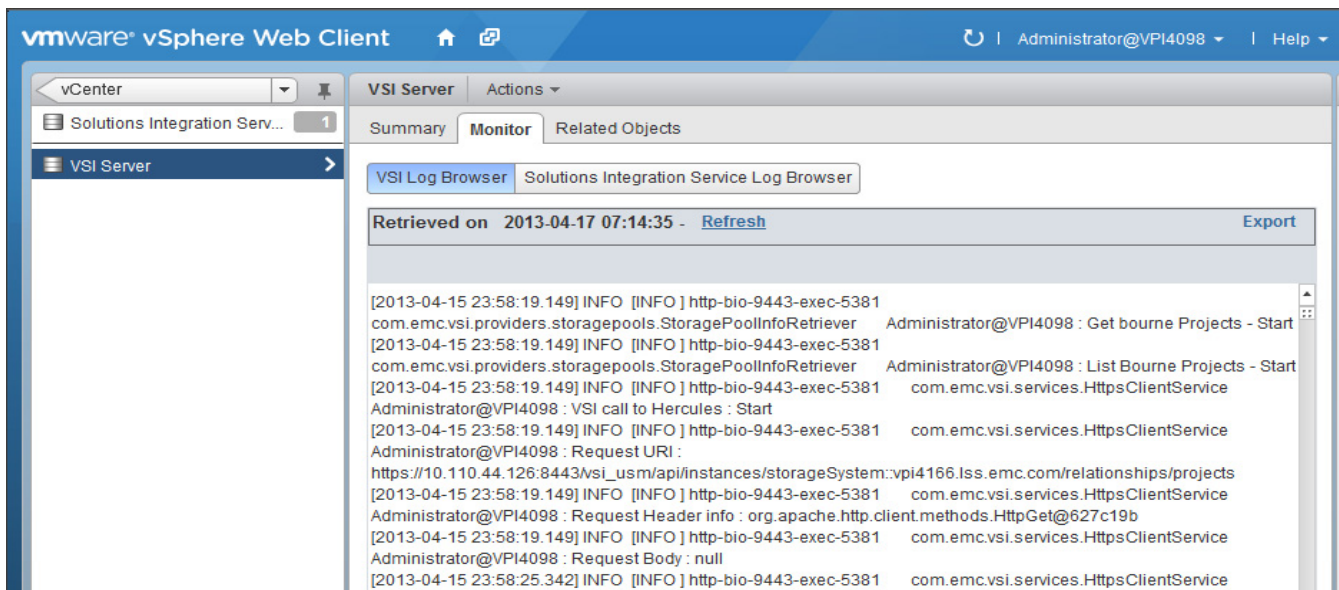


Figure 27 Viewing VSI Log files

Accessing log files when the VSI plug-in is not available

If the VSI plug-in is unavailable, access the log files for the EMC Solutions Integration Service and VSI plug-in as follows.

To access EMC Solutions Integration Service log files:

1. Log in to the vSphere Web Client.
2. Select **Home** > **Inventory Lists** > **Virtual Machines**.

3. Expand the navigation tree in the left pane, right-click the Solutions Integration Service virtual machine, and select **Open Console**.

Note: To release the cursor from the Console window, press **Ctrl–Alt**.

4. Click inside the console window and press **Enter**.
5. Enter your user ID and password (for example, root/emc).
6. After you have logged in, type **cd** to change to the `/var/log/` folder.
7. Open the `vsi_usm.log` file and copy the contents.

You can use `vi`, `emacs`, `more`, `less`, and so forth.

To access VSI log files:

1. Using Remote Desktop, log in to the Windows virtual machine that is hosting the vSphere Web Client web service.
2. Open Windows Explorer and navigate to the `C:\ProgramData\VMware\vsphere Web Client\serviceability\logs\` folder.
3. Open the `vsphere_client_virgo.log` file.

